



1996-1998

UNIVERSITY OF WASHINGTON

GENERAL
CATALOG



UNDERGRADUATE STUDY

GRADUATE STUDY

UNIVERSITY OF WASHINGTON

GENERAL CATALOG 1996-98

UNDERGRADUATE STUDY

GRADUATE STUDY

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PRESIDENT'S MESSAGE



A university is a community of scholars and artists, a place where faculty and students communicate with each other to enrich human understanding. Universities have played an essential role in societies for hundreds of years, promoting learning and culture, generating new knowledge, and training professionals in specialized callings. The University of Washington is one of the finest universities in the world.

It is also an exciting place to be, with a lively interplay of teaching, research, and public service. Its contributions to the state, the nation, and the world will continue to grow as we face the challenges of the coming twenty-first century.

Richard L. McCormick

Richard L. McCormick, President

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ACADEMIC CALENDAR

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1996-97

Summer Quarter 1996

Full-term and term a classes begin . . . June 17
Independence Day holiday July 4
Term a classes end July 17
Term b classes begin July 18
Full-term and term b classes end . . . August 16

Autumn Quarter 1996

Classes begin September 30
Veterans Day holiday November 11
Thanksgiving recess November 28, 29
Last day of instruction December 11
Final examinations December 12-19

Winter Quarter 1997

Classes begin January 6
Martin Luther King, Jr.'s Birthday holiday January 20
Presidents' Day holiday February 17
Last day of instruction March 14
Final examinations March 17-21

Spring Quarter 1997

Classes begin March 31
Memorial Day holiday May 26
Last day of instruction June 6
Final examinations June 9-13
Commencement June 14

1997-98

Summer Quarter 1997

Full-term and term a classes begin . . . June 23
Independence Day holiday July 4
Term a classes end July 23
Term b classes begin July 24
Full-term and term b classes end . . . August 22

Autumn Quarter 1997

Classes begin September 29
Veterans Day holiday November 11
Thanksgiving recess November 27, 28
Last day of instruction December 10
Final examinations December 11-18

Winter Quarter 1998

Classes begin January 5
Martin Luther King, Jr.'s Birthday holiday January 19
Presidents' Day holiday February 16
Last day of instruction March 13
Final examinations March 16-20

Spring Quarter 1998

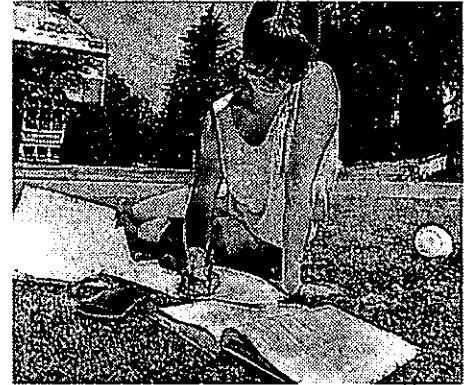
Classes begin March 30
Memorial Day holiday May 25
Last day of instruction June 5
Final examinations June 8-12
Commencement June 13

For directory assistance, telephone the University switchboard, (206) 543-2100.

Address correspondence to:

University of Washington
(Name of office and box number)
Seattle, Washington 98195

UW Homepage:
<http://www.washington.edu>



The University of Washington reaffirms its policy of equal opportunity regardless of race, color, creed, religion, national origin, sex, sexual orientation, age, marital status, disability, or status as a disabled veteran or Vietnam era veteran. This policy applies to all programs and facilities including, but not limited to, admissions, educational programs, employment, and patient and hospital services.

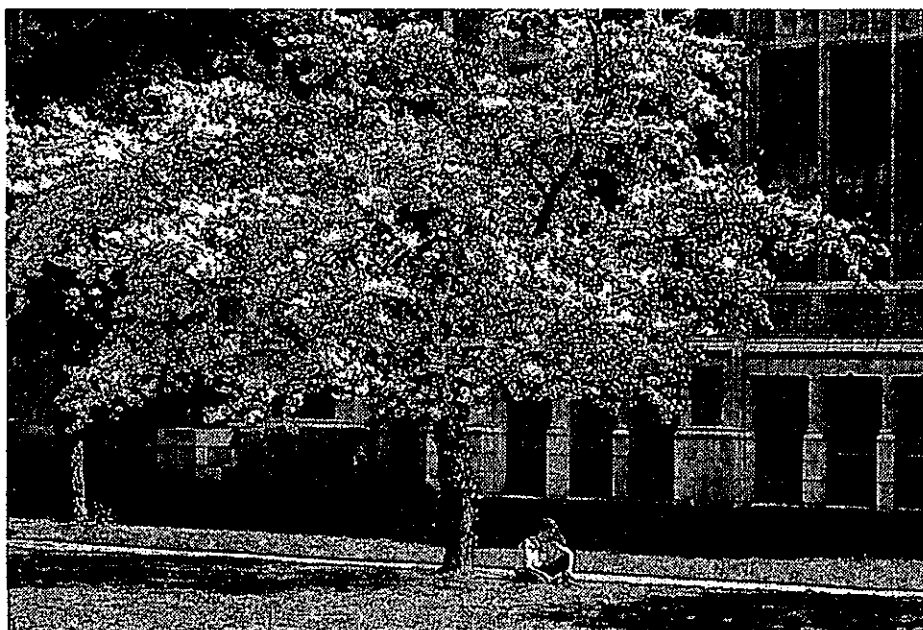
Any discriminatory action can be a cause for disciplinary action. Discrimination is prohibited by Presidential Executive Order 11246 as amended; Washington State Gubernatorial Executive Orders 89-01 and 93-07; Titles VI and VII of the Civil Rights Act of 1964; Washington State Law Against Discrimination RCW 49.60; Title IX of the Education Amendments of 1972; State of Washington Gender Equity in Higher Education Act of 1989; Sections 503 and 504 of the Rehabilitation Act of 1973; Americans with Disabilities Act of 1990; Age Discrimination in Employment Act of 1967 as amended; Age Discrimination Act of 1975; Vietnam Era Veterans' Readjustment Act of 1972 as amended; other federal and state statutes, regulations, and University policy. Coordination of the compliance efforts of the University of Washington with respect to all of these laws and regulations is under the direction of the Assistant Provost for Equal Opportunity, Dr. Helen Remick, University of Washington, Equal Opportunity Office, Box 354560, 4045 Brooklyn Avenue Northeast, Seattle, WA 98195, telephone (206) 685-3263/V or 543-6452/TTY.

Additional information concerning the equal opportunity and affirmative action policies and procedures, including complaint procedures, is in the *Operations Manual*, D46.1, D46.2, D46.3, and D46.4, and the *UW Handbook*, Vol. IV, p. 44.

Information on reasonable accommodation for students with disabilities is available from the following offices: for classroom and academic-related accommodation, call Disabled Student Services at 543-8924/V, 543-8925/TTY, or email at uwds@u.washington.edu; for other non-academic related information and accommodation, call Disability Services Office at 543-6450/V, 543-6452/TTY, or email at access@u.washington.edu.

Copies may be purchased from the University Book Store, 4326 University Way Northeast, Seattle, Washington 98105, telephone (206) 634-3400.

Postmaster: Send address changes to University of Washington, Box 355835, Seattle, Washington 98195.



Dates in this calendar are subject to change without notice. A detailed calendar with the latest information on registration is printed in each issue of the quarterly *Time Schedule*.

USING THE GENERAL CATALOG



The material in this catalog has been compiled and organized to provide the reader with a comprehensive overall view of the programs and courses at the University of Washington. It includes academic requirements and procedures necessary for admission and graduation. Information on programs, faculty, and courses is usually arranged in alphabetical order following departmental structure within each school or college.

Because curriculum revisions and program changes usually occur during the two-year period the *General Catalog* is in circulation, students should assume the responsibility of consulting the appropriate academic unit or adviser for more current or specific information. The quarterly *Time Schedule* gives information on courses offered, class hours, and classroom locations, and has the latest calendar dates, fees, and details on registration.

All announcements in the *General Catalog* are subject to change without notice and do not constitute an agreement between the University of Washington and the student.

Founded in 1861, the University of Washington is the oldest state-assisted institution of higher education on the Pacific coast. From its original site on a 10-acre tract of wooded wilderness that is now located in downtown Seattle, the campus has grown to comprise 703 acres of trees, landscape, and buildings. Located between the shores of Lake Washington and Lake Union, it is in a residential section of the city that long has been considered one of the most attractive in the nation.

Enrollment at the University in autumn quarter 1995 was 33,996, of which 24,838 were undergraduates and the balance were in professional and graduate programs. Approximately 90 percent of the undergraduates enter as freshmen from Washington high schools or as transfer students from Washington community colleges or other colleges and universities in the state. The grade-point average for the regularly admitted freshman class entering in autumn quarter 1995 was 3.60. In 1995, the full-time teaching faculty of the University numbered 2,700 members.

The University recognizes as one of its highest educational priorities the need to increase the number of qualified minorities in certain academic fields and professions to which they have been historically denied access or have been traditionally underrepresented. Special educational support services are provided through the Office of Minority Affairs and the Graduate School's Minority Education Division to facilitate the entry of persons from underrepresented minorities and to enhance their likelihood of success while attending the University.

Academic Assessment

As part of an ongoing effort to assure the quality of the education received by its students, the UW has instituted a comprehensive assessment program designed to measure student learning outcomes. This assessment program conforms with guidelines established by the state's Higher Education Coordinating Board. From time to time, students may be asked to participate in outcomes assessment by completing satisfaction surveys, sitting for achievement examinations, compiling portfolios of their academic work, or providing other academic performance indicators. The purpose of all such activities is to monitor the quality of our academic programs.

While it is a University requirement that students participate in these assessment activities when asked to do so, participants can be assured that assessment results will be treated in the strictest professional confidentiality. Whenever those results appear in University assessment reports or other public documents, they will be presented anonymously and in aggregate fashion.

Academic Sessions

University instruction is offered during autumn, winter, and spring quarters, each lasting approximately 11 weeks. The 9-week summer quarter is divided into two 4½-week terms.

Accreditation

The University is accredited by the Northwest Association of Schools and Colleges and is a member of the Association of American Universities. Individual schools and colleges are members of the various accrediting associations in their respective fields. Currently enrolled or prospective students should contact the Office of the Registrar to review accreditation documents for the University and the respective department to review programmatic accreditation documents.

Academic Programs

The University offers a wide range of undergraduate, graduate, and professional degree programs. In addition to these programs, the following educational opportunities are available.

Certificate Programs

UW Extension offers more than 50 carefully planned credit and noncredit certificate programs of study in several areas. Some certificate programs address such personal interest areas as film, writing, and sound production. Other programs focus on specific careers in business, industry, and technology, offering specialized training that supplements other education and work experience. Students are prepared to enter new fields or to grow professionally in areas ranging from accounting to C programming to project management. All certificate programs and instructors have been approved by the appropriate academic units. Programs are designed by advisory boards consisting of leading professionals in the field and UW faculty. To accommodate working professionals, UW Extension schedules most classes to meet evenings or week-ends. Course fees and admission requirements vary, and enrollment in all certificate programs is limited. More information may be obtained by consulting the quarterly UW Extension catalog, available by telephone, (206) 543-2320.

Evening Classes

Opportunities for evening study at the University are varied to serve individual student interests and academic goals. Matriculated students may enroll in day or evening courses listed in the quarterly *Time Schedule*. For nonmatriculated (not formally admitted) students, UW Extension offers hundreds of evening credit and noncredit courses, which are described in the UW Extension section of this catalog. Matriculated students enrolling in courses listed only in the UW Extension catalog pay course fees in addition to regular tuition.

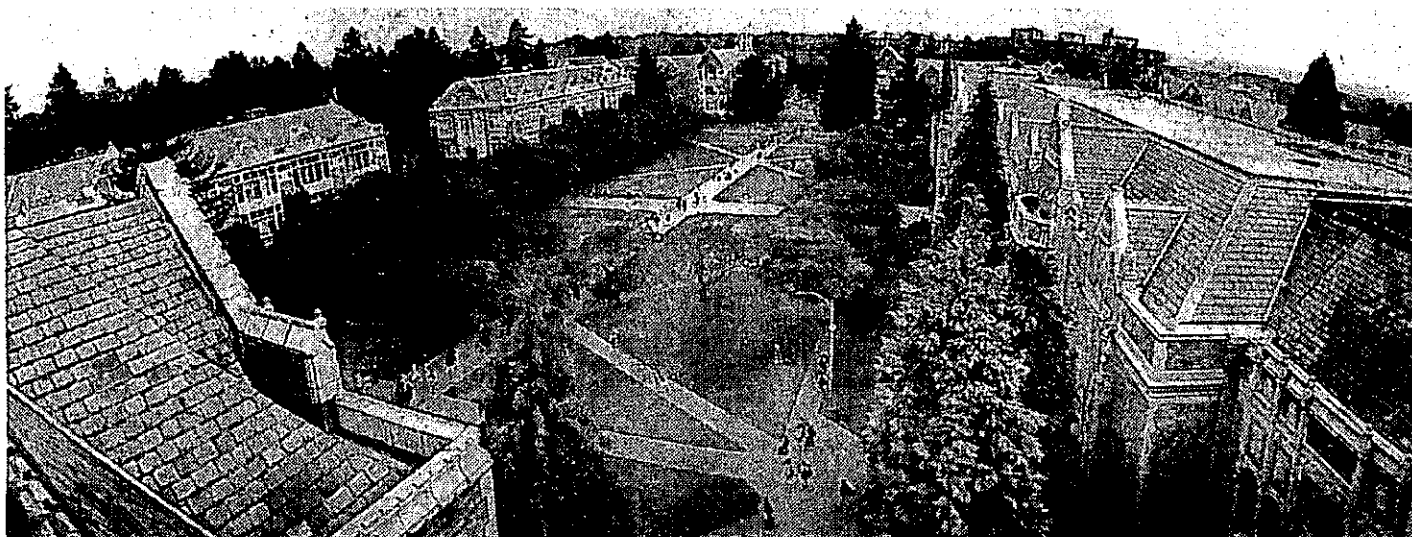
Evening Degree Program

Students can complete a bachelor's or a graduate degree in the evening through the UW Evening Degree Program on the Seattle campus. A wide variety of courses are scheduled for the convenience of evening degree students.

Evening students can earn baccalaureate degrees offered by the College of Arts and Sciences in anthropology, communications, English, general studies, history, humanities, political science, psychology, social sciences, and sociology. The School of Business Administration offers the Bachelor of Arts in Business Administration degree in the evening. Graduate level programs include a Master of Science in Construction Management, the Master of Social Work (M.S.W.), the Master of Professional Accounting (M.P.Acc.), and the Master of Public Administration (M.P.A.). Beginning in autumn 1996, evening degree students can enroll in degree programs leading to the Master of Business Administration (M.B.A.), and the Master of Education (M.Ed.) and the Doctor of Education (Ed.D.) in educational leadership and policy studies with an emphasis on higher education. For more information on this program call (206) 543-6160 or 543-0898 (TDD).

Summer Quarter

During summer quarter, more than 2,000 courses in most major fields are available to graduate and undergraduate students pursuing degree programs on a year-round basis as well as to summer-only students seeking to broaden, intensify, or refresh their subject-matter competence. Summer-only students can apply for admission as nonmatriculated students, and can earn credits which may apply toward a degree at another college. This status also accommodates teachers and school administrators who take special interest courses to earn additional university credits and postbaccalaureate students who do not desire formal admission to a graduate, or second undergraduate, program. Freshman students entering from high school are encouraged to begin their college work



THE UNIVERSITY

in the summer in the Freshman Summer Start Program. Through the Office of Admissions, enrollment in summer courses may be arranged for specifically qualified students who have not yet completed high school.

Credits earned during summer quarter are evaluated as residence credits; and, with the exception of separate fee schedules for medical and dental students, summer quarter fees closely parallel those of the other quarters. Nonresidents and residents pay the same fees during the summer.

A complete listing of summer quarter courses is published in the Summer Quarter bulletin, available on request from the University of Washington, Office of Summer Quarter, Box 354224, Seattle, WA 98195, telephone (206) 543-2320 or 1-800-543-2320.

UW Bothell and UW Tacoma

The University offers bachelor's and master's degree programs at the Bothell and Tacoma campuses designed to provide additional educational opportunities principally for residents of the Central Puget Sound region. The campuses are located in Bothell, 20 miles to the north of the Seattle campus, and in Tacoma, 35 miles to the south. Undergraduate programs at Bothell and Tacoma are offered at the upper-division level, for students who have already completed the first two years (90 credits) of undergraduate study. At the present time the following degree programs are available at both campuses: Bachelor of Arts in Liberal Studies, with concentrations in U.S. studies and international studies; Bachelor of Arts in Business Administration, with concentrations in marketing and management; Bachelor of Science in Nursing (designed for registered nurses) and Master of Nursing; and the Master of Education. In addition, a Teaching Certificate Program is available at both campuses for students preparing to teach at the K-8 grade levels. Further information is provided in the University of Washington, Bothell and University of Washington, Tacoma sections of this catalog.

Resources and Facilities

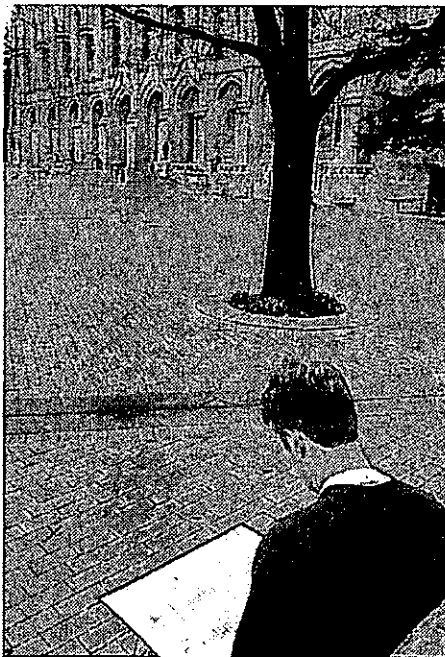
Burke Museum

The Thomas Burke Memorial Washington State Museum serves both the University and the public in its mission to encourage understanding of, and appreciation for, the natural and cultural heritage of Washington State, the Pacific Northwest, and the Pacific Rim. The Burke has three scientific divisions—anthropology, geology, and zoology—holding over three million specimens. Collections of national and international ranking include those of Northwest Indian art, Northwest archaeology, vertebrate and invertebrate paleontology, mammals, and birds. Other noteworthy collections include Asian and Pacific ethnography, minerals and gems, paleobotany, mammals, arachnids, lepidoptera, and micropaleontology.

The collections are accessible for research by UW faculty, students, and visiting scientists. The museum's public galleries feature an active schedule of special exhibits, as well as long-term exhibits of Northwest Coast Native art and highlights from the geology and zoology collections. Hours are 10 a.m. to 5 p.m. daily except July 4th, Thanksgiving, December 25th, and January 1st. Admission is free to UW staff and students.

Computing & Communications

The diverse computing needs of instructional and research groups on campus are served by centralized organizations as well as individual schools, colleges, and departments. Together these provide a variety of computers, facilities, and support services to members



of the UW community. Computing & Communications (C&C) is the central UW organization for computing and networking, and it offers an array of computing options and services.

Students, faculty, and staff members can create their own Uniform Access accounts on multi-user computers provided by C&C, which give them access to tools for teaching, learning, and research. They can use Internet resources and the World Wide Web, including a Web server where they can create their own Web pages. They can browse the UW course catalog and *Time Schedule*, use electronic mail to communicate with classmates and colleagues; get lists of campus events; research term papers; search library catalogs; use software for statistics, graphics, programming, and text formatting; and use their own computer and modem to dial in to their accounts from off campus.

Two C&C drop-in computer labs are ideal places to explore computer resources. These labs offer PC and Macintosh computers and X terminals (terminals using a graphical windowing system) connected to the campus network and computers with special adaptive equipment to assist people with motor, visual, hearing, or learning impairments. In addition, resources are available in the Locke Visualization Lab (located in the Health Sciences Center) to help faculty, staff, and students doing research to prepare presentations, publications, teaching tools, or Web pages.

C&C, in association with the UW Libraries, has developed extensive information resources including library catalogs and bibliographic databases that are available on the campus network via the UW Web page at <http://www.washington.edu> or the UW Information Navigator (UWIN). C&C provides other computing-associated services, such as telecommunications services; UWTV programming, individual consulting, microcomputer and workstation support, training, administrative systems support, publications, and online documentation.

For details about the computing resources available on campus through C&C (including how to get started and how to find free or low-cost training), see the Computing & Information Technologies Web page at http://www.washington.edu/tech_home/ or look in UWIN under Computing & Information Technologies. Other questions can be answered by sending email to: help@cac.washington.edu or by calling 543-5970.

Early Entrance Program

A unique UW program provides early University entry to exceptionally bright, highly motivated adolescents who are ready for college-level work by age fourteen, the usual age of entering high school. A transition school provides an intensive, one-year bridge to regular, full-time University enrollment; counseling support and a "home base" are also provided to full-time students. Information is available from the Halbert Robinson Center for the Study of Capable Youth, Guthrie Annex II, 543-4160.

Office of Educational Assessment

Testing and educational evaluative services for University departments and individual students are available at the Office of Educational Assessment. Of particular interest to prospective and entering students are the office's programs for admissions testing, including the Scholastic Aptitude Test (SAT), and for placement testing in mathematics and foreign languages. For the University student approaching graduation, the Office administers tests required for admission to graduate, law, medical, and other professional schools, as well as those tests often requested by prospective governmental or private employers. The Office is located on the fourth floor of Schmitz Hall.

English As A Second Language Department

The English As A Second Language Department offers a variety of courses to nonnative speakers of English from many different countries. Additional information appears in the University Extension section of this catalog.

Hall Health Primary Care Center

The University provides outpatient health and medical care for students through the Hall Health Primary Care Center. Located on campus, the Center is staffed by physicians and nurse practitioners and is accredited by the Accreditation Association for Ambulatory Health Care.

Services include preventive care, health education, and diagnosis and treatment of illness or injury.

The following specialties are represented: dermatology, family planning, family practice, pediatrics and prenatal services, minor out-patient surgery, gynecology, internal medicine, orthopaedics, physical therapy, psychiatry, and sports medicine. Common conditions in other specialties also may be treated. The Health Education staff offer a variety of health promotion services including providing learning resources, assistance with self-care, and educational programs.

All regularly enrolled UW students are eligible for health service upon presentation of a current University student identification card. Most office visits are subsidized through the student activities fee. Modest fees are charged for x-rays, laboratory tests, physical examinations, mental-health visits, physical therapy, travel consultations, allergy injections, and a few other services. Students must pay for outside laboratory and medical services and for prescriptions filled at the pharmacy.

Dependents of students are welcome at Hall Health Primary Care Center and are eligible for care on a fee for service basis. Fees are comparable to community rates and insurance companies are billed whenever possible.

Hall Health Primary Care Center is a provider of most managed care plans including the Basic Health Plan and Healthy Options.

Student health insurance, available through the UW, should not be confused with services through Hall Health Center. A student may use Hall Health Center services without having student insurance. For major

surgery and the occasional illness of exceptional severity that requires treatment elsewhere, the student should protect himself or herself against the expense by obtaining student health insurance. A low-cost medical-surgical-hospital policy, designed to meet those specific needs, may be purchased at the time of registration.

Hall Health Primary Care Center is open Monday, Thursday, and Friday from 8 a.m. to 5 p.m.; Tuesday from 9 a.m. to 5 p.m.; Wednesday from 8 a.m. to 8 p.m.; Saturday from 9 a.m. to 3 p.m.

Additional information may be obtained from Hall Health Primary Care Center, Box 354410, University of Washington, Seattle, WA 98195, (206) 685-1011.

Henry Art Gallery

The Henry Art Gallery, the art museum of the University, brings to the campus and the community special exhibitions of contemporary and historical work in all media. The offerings include exhibitions, lectures, symposia, and an active publishing program. The University's permanent collection includes a large research collection of ethnic textiles and Western dress as well as a small but distinguished collection of European and American paintings, prints, drawings, photographs, and contemporary American ceramics and Japanese folk pottery.

The Henry is in the midst of a major expansion project which will quadruple the size of the museum when it reopens in early 1997. Renovation and expansion design is by internationally acclaimed architect Charles Gwathmey and will result in increased access to exhibitions and collections for students, classes, and researchers.

The Henry Gallery Association offers membership to students, faculty members, and the community for the purpose of supporting the museum's programs. UW students are admitted free at all times. Please call the Henry at 543-2281 for details.

Intercollegiate Athletics

The Department of Intercollegiate Athletics operates an integrated program for men and women. Intercollegiate competition is limited to full-time students.

There are 12 women's teams: cross-country, soccer, volleyball, gymnastics, basketball, swimming, indoor track, tennis, golf, softball, outdoor track and field, and crew. Women's competition is in the ten-team Pacific-10 Conference (Pac-10).

Eleven sports are offered for men's competition: baseball, basketball, crew, cross-country, football, golf, soccer, swimming, tennis, indoor track, and outdoor track and field. Men's teams compete on a full Pacific-10 Conference schedule, as well as with other institutions locally, regionally, and nationally. The University is a member of the National Collegiate Athletic Association.

Facilities available to intercollegiate athletic teams are Hec Edmundson Pavilion, Pavilion Addition, Husky Stadium, Graves Baseball Field, Husky Softball Field, Conibear Shellhouse and other crew facilities on Lake Washington at the eastern boundary of the campus, the Lloyd Nordstrom Tennis Center, and a variety of golf courses throughout the greater Seattle area.

Office of International Programs and Exchanges

The Office of International Programs and Exchanges (OIPE) administers and cooperates in more than 40 international study programs in Latin America, Europe, the Middle East, Africa, and Asia. Qualified undergraduate and graduate students are enrolled concurrently at the University and abroad, earning UW credit and maintaining residency and financial aid eligibility. Quarter, semester, and academic year programs are offered. Opportunities for study include language and

liberal arts courses in Avignon, Cologne, Guadalajara, Jerusalem, London, and Siena; advanced language programs requiring two to three years college-level language preparation in Beijing, Cairo, Granada, St. Petersburg, Mexico City, and Rennes; and specialized professional programs in such sites as Denmark, England, Finland, and Japan. The University also has reciprocal exchange agreements with major research institutions abroad, including universities in Tokyo, Mexico City, Montpellier, and Tübingen and the Institut d'Études Politiques in Paris. These arrangements allow qualified UW students to enroll in regular courses at the foreign university and maintain full UW standing.

Many overseas programs are supported by scholarships from private endowments. Additional scholarship support is available to undergraduate students and special consideration is given to underrepresented minority students.

Program information and counseling are available in the Office of International Programs and Exchanges, 516 Schmitz, Box 355815; telephone (206) 543-9272; email: oipec@u.washington.edu.

Language Learning Center

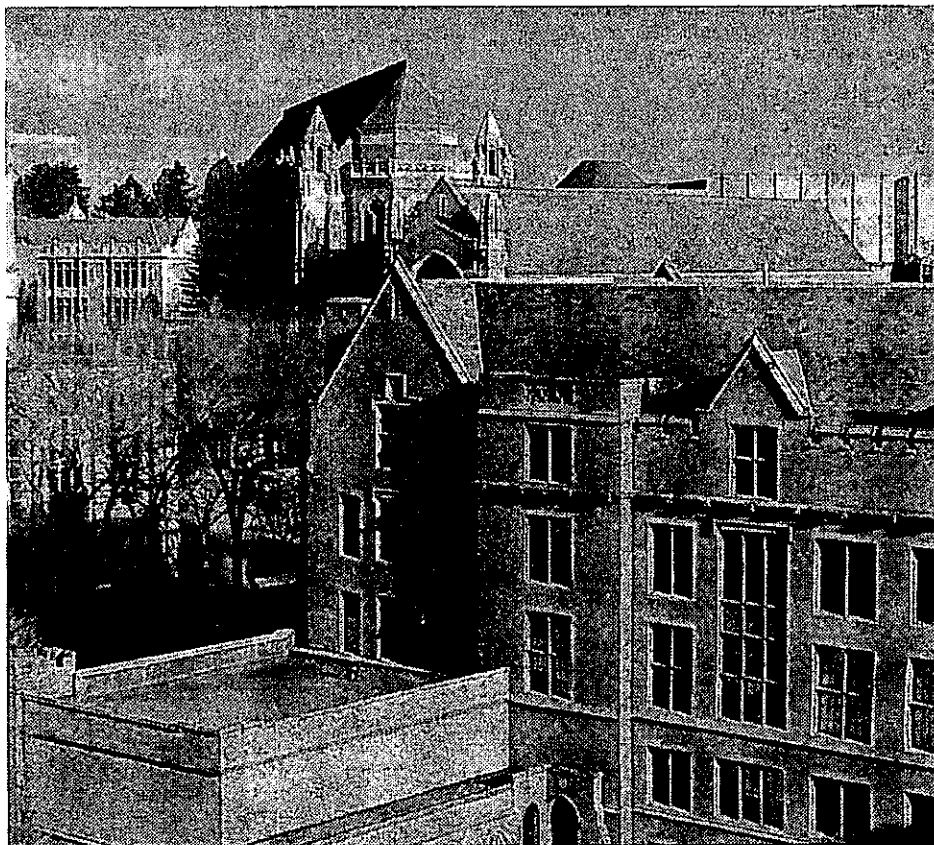
The Language Learning Center (LLC), located in the daylight basement of Denny Hall, provides support and services to the university community for the teaching, learning, and researching of languages and cultures. Available services include: audio cassette listening/recording facilities; duplication of audio cassettes onto user cassettes; sale of pre-recorded audio cassettes; facilities for viewing video tape, CD-ROM, laserdisc, and satellite materials; and access to foreign telecasts via satellite. The LLC has recording facilities and several electronic classrooms equipped with audio, video, and cable television equipment. Instructors can reserve the electronic classrooms for speaking/listening practice, viewing of foreign video tapes and satellite programming, and informal conversation practice. Computer-Assisted Language Learning (CALL), integrated with

digital multimedia, is available to students enrolled in targeted UW language classes for which programs have been developed.

University Libraries

The University Libraries, with more than five million volumes, consists of the Suzzallo and the Allen Libraries, Odegaard Undergraduate Library, Health Sciences Library and Information Center, East Asia Library, 15 branch libraries, and the UW Bothell and UW Tacoma Libraries. The University Libraries maintains nationally-ranked collections in fisheries, forestry, East Asian languages and literature, Scandinavian studies, and Slavic and South Asian area studies. In addition to books and periodicals, the libraries' holdings include archival materials and manuscripts, maps, newspapers, microforms, research reports, media materials, CD-ROMs, government publications, photographs, and architectural drawings. The UW Libraries Catalog is a fully integrated, computerized system that provides bibliographic information and circulation status for the cataloged holdings of the University Libraries. The University Libraries and Computing & Communications are working together to provide electronic access to a multitude of information sources—online catalogs, journal databases, the daily news, the weather, an encyclopedia, the Internet—through UWIN, the University of Washington Information Navigator.

The Suzzallo and Allen Libraries, a combined facility, houses the major social sciences and humanities collections. The Suzzallo Library serves as the central acquisitions and processing unit of the campus libraries' system and contains the interlibrary borrowing service, fee-based document delivery service (Library Express), fee-based research service (Research Express), and the public service divisions of Government Publications, Microform and Newspaper Collections, Reference and Research Services, Periodicals, and International Studies (Near East, Slavic and Eastern Europe, South Asia, and Southeast Asia). Reference



assistance is available most hours the library is open. The Allen Library houses the Natural Sciences Library, the Special Collections and Preservation Division, which includes the Pacific Northwest Collection, and Manuscripts and University Archives. The Libraries' administrative offices are also located in Allen.

The Odegaard Undergraduate Library (OUGL) collection supports the undergraduate curriculum and is interdisciplinary, with an emphasis on materials in the social sciences and the humanities. The primary reserve unit for non-health sciences classes is in OUGL. Media services and materials for course-related usage are provided in the University Libraries Media Center in OUGL. Many of the study materials needed by undergraduates may be found in this library. OUGL librarians also offer classes on how to use the library, including computerized indexes and search strategies for term papers.

The Health Sciences Library and Information Center (HSLIC) collection houses the largest and most comprehensive collection of health sciences materials in the Pacific Northwest. The library supports education, research, and patient care in the fields of dentistry, medicine, nursing, pharmacy, public health, and social work, as well as in the related behavioral, biological, and quantitative sciences. In addition to a print collection of almost 350,000 volumes, the library offers access to a wide range of non-print resources and provides extensive user services, including curriculum-based microcomputer instructional support; interlibrary loan services for health sciences personnel; and document delivery services for affiliates and non-affiliates. Services to faculty and students at Harborview Medical Center are provided through the K. K. Sherwood Library in Harborview Hall. Services to the School of Social Work are provided through a library located in the School of Social Work Building. HSLIC serves as headquarters for the National Network of Libraries of Medicine/Pacific Northwest Region (NN/LM, PNR), with responsibility for promoting access to biomedical information resources in Alaska, Idaho, Montana, Oregon, and Washington. The library houses administrative offices for the UW Health Sciences Center IAIMS (Integrated Advanced Information Management System) program and the HSLIC/School of Medicine's Research Funding Service.

The East Asia Library is one of the major resource centers of its kind in the United States and is an international leader in the provision and development of automated services for its subject areas. The collections are especially strong in anthropology, archaeology, economics, history, art, languages, literature, law, music, political science, religion, and sociology with respect to the histories and cultures of China (including Taiwan and Hong Kong), Japan, Korea, Inner Asia, and Tibet.

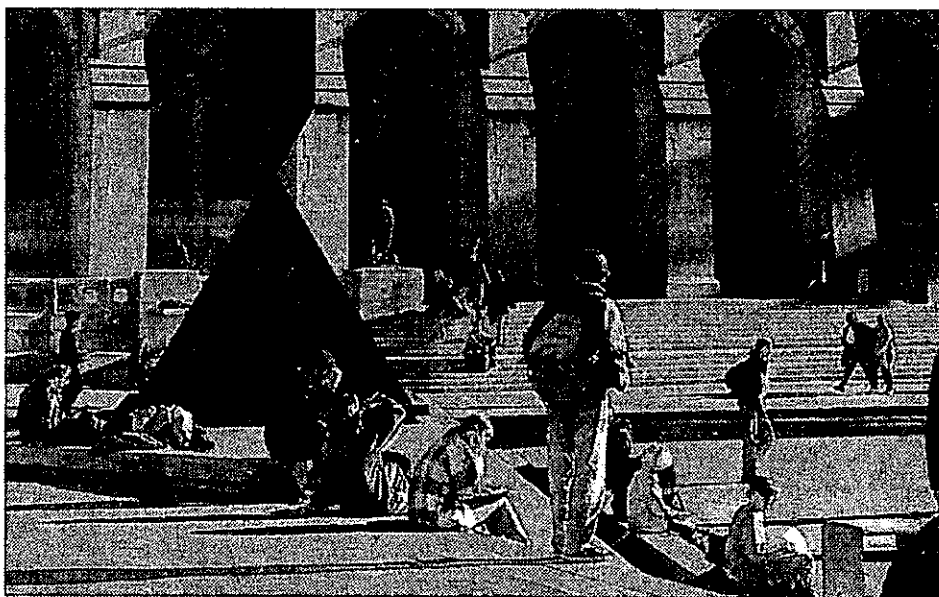
University Research Facilities

In addition to the campus facilities described in this section, the University has numerous educational and cultural resource centers. Academic or research activities and facilities that are of general significance in all or many fields of knowledge throughout the University are listed in the Research section of this catalog; others are described in individual school or college sections.

University Theatres

The School of Drama operates three theatres: the Playhouse, with a thrust stage; the Penthouse Theatre, the first theatre-in-the-round built in America; and Meany Studio Theatre, which seats approximately 300 and contains a proscenium stage. Faculty- and student-directed plays drawn from the full range of world dramatic literature are presented throughout the year.

The School also mounts annual productions in the two theatres of Meany Hall, and it gives technical and design support to opera and dance productions of the School of Music.



Women's Center

The Women's Center, located in Imogen Cunningham Hall, promotes the advancement of women on campus and in the community by offering a wide variety of non-credit workshops and classes including college success classes (GRE preparation courses, computer, and writing classes); career and financial classes; and fitness, health, and creativity classes. The Center provides services for women reentering the University and houses a modest library with a job board and scholarship information as well as the Cunningham Gallery which features fine arts and crafts for viewing or purchase.

Housing and Food Service

University-Owned Housing

Students with disabilities that require special accommodations receive first priority for assignment to University Housing.

Residence Halls

The UW provides housing for about 4,000 students in seven residence halls. All are located within easy walking distance of classrooms and other campus facilities. Food service is available to residence hall students at locations throughout the campus through the use of *À La Carte Plus*™, a debit card system. Students live in an environment of responsible freedom, and a residential life staff enhances the University experience through a variety of educational, cultural, and social programs.

Interest houses in the residence halls are available for students seeking a particular learning experience. These special living environments include Freshman House, Outdoor House, International House, and Russian House.

To obtain more information and applications for residence halls, call (206) 543-4059 or write to the Student Services Office, 301 Schmitz, Box 355842, Seattle, WA 98195.

Single-Student Apartments

The University also has apartments available for 520 single students, 20 years of age or older. Stevens Court provides four- and six-bedroom apartments, that have private bedrooms, a common kitchen and living room, and bathrooms.

An application form or additional information on single-student apartments may be obtained by writing to the Student Services Office, 301 Schmitz, Box 355842, Seattle, WA 98195, or calling (206) 543-4059.

Family Housing

Convenient and economical apartment housing is available for about 500 student families. Community programs for adults and children are presented by the Family Housing and Single Student Apartments Resident Services Office. To obtain information about family housing facilities, eligibility requirements, and application procedures, write to the Student Services Office, 301 Schmitz, Box 355842, Seattle, WA 98195, or call (206) 543-4059.

Food Service

University Food Services operates dining facilities throughout the campus. The diverse schedules and dietary preferences of the campus community are accommodated by providing full meal service, *à la carte* menu items, and catering services as well as convenient hours of operation.

Food may be purchased through the *À La Carte*™ program at all University Food Services facilities and two on-campus convenience stores. This program, available to the entire campus community, offers pre-paid meal service through use of a debit card. The *À La Carte*™ program provides the flexibility for purchase of food at many locations on campus. For more information on the *À La Carte*™ program, call (206) 543-7222.

Transportation and the U-PASS

The U-PASS transportation program makes numerous commute options available at a deeply discounted price. With a U-PASS sticker, you gain access to unlimited rides on all Metro and Community Transit routes, carpool parking, and the Night Ride (a night van service to nearby neighborhoods)—all for the price of the pass. In addition, the U-PASS subsidizes a vanpool program, and a number of local merchants offer discounts to pass holders. U-PASS funds have also provided bicycle improvements, including more secure racks, lockers, the East Campus bike route, and other safety improvements around campus.

Student parking is available for a daily fee in the E1 lot on Montlake Boulevard NE, on the east side of campus. Two-person carpools may park free in the E1 lot by arriving between 7:00 a.m. and 9:30 a.m. Student carpools with three U-PASS holders may park free on main campus. A few parking permits are available from Parking Services to commuter students on a first-come, first-served basis the first day of each quarter.

For more information, visit a staffed Commuter Center at Parking Services, 3901 University Way; South Campus Parking, T-466A Health Sciences; or the HUB information desk. Unstaffed Commuter Centers, which contain brochures and bus timetables, are located at By George, Schmitz Hall, the Visitors Information Center, E Court Cafe (Health Sciences Center), South Campus Center, and the UW Medical Center main entrance.

Student Services

Office of the Vice President for Student Affairs

The Division of Student Affairs assists the University in fulfilling its academic mission by providing a broad range of services and programs designed to further the educational and personal development of students. The Division consists of ten units: Admissions and Records, Center for Career Services, Student Counseling Center, Disabled Student Services, Housing and Food Services, International Services Office, Recreational Sports Programs, Student Financial Aid, Student Publications, and Student Activities and Union Facilities.

Students are encouraged to contact the Office of the Vice President for Student Affairs, 543-4972, 476 Schmitz, for information concerning various aspects of extra-class life at the University.

Center for Career Services

The University's Center for Career Services, which includes a Minority Job Placement Program, offers career information and services to assist undergraduates, graduate students, and degree- or certificate-holding alumni (1) to make a viable connection between their academic backgrounds and their career or long-range employment objectives, (2) to develop effective job-seeking strategies, and (3) to find suitable employment upon leaving the University or to change employment thereafter.

A variety of programs are offered and include individual and group career counseling, job search seminars, career-related internships, an annual career fair, employer and alumni career panels, mock interviews, a résumé database, campus interviews, and summer employment listings. A 24-hour telephone jobline to access internship and noncareer-related jobs is also available.

Students are encouraged to begin using the services of the Center early in their academic careers. This is best accomplished by visiting the Center at 301 Loew Hall or calling 543-0535 to make an appointment with a career counselor.

Childcare Program

The Childcare Program provides eligible student-parents with direct financial assistance to purchase services at licensed childcare facilities in the Seattle-King County area. To apply, students must submit the Free

Application for Federal Student Aid (FAFSA) to the designated processor and a Childcare Request Application to the Childcare Office, 466 Schmitz. Brochures describing the program are available at 466 Schmitz, 543-1041.

Student Counseling Center

All matriculated students at the University may make use of the services of the Student Counseling Center and its staff of psychologists and counselors to discuss educational progress, personal concerns, or career goals. Individual, couples, and group counseling is provided for a variety of issues including academic, career, personal, and social. Psychological tests, when necessary, are provided as part of the Center's counseling service. The video, *Where There's A Will, There's An A*, is a component of academic counseling. Workshops on special topics such as test anxiety, time management, test taking, note taking, and stress management are also available. There is a small fee for services.

Students are not charged for the first assessment appointment, which is provided to determine if the Student Counseling Center's services are appropriate. Individual appointments after the first visit currently cost \$16 each. Fees for participation in the group program range from \$40 to \$80. For students financially unable to pay the fee, efforts are made to find other alternatives. The Center is located on the fourth floor of Schmitz Hall.

Treatment for substance abuse and long term therapy (beyond 15 sessions) is not provided.

Disabled Student Services

The University provides program access to students with either permanent or temporary disabilities through a variety of services and equipment. The Disabled Student Services (DSS) Office coordinates academic accommodations for enrolled students with disabilities. Accommodations may include classroom relocation, sign language interpreters, recorded course materials, notetaking, and priority registration. DSS also provides needs assessment, mediation, and referrals.

Services must be arranged in advance and require documentation of the disability.

Technical and adaptive equipment is available through both DSS and Computing & Communications. Information and equipment locations on campus may be obtained from DSS. Publications include: *Access Guide*, (showing classroom access, elevator locations, ramps, parking, and restrooms), *Campus Mobility Map*, *Adaptive Equipment List*, and a quarterly newsletter.

To the maximum extent possible, students with disabilities are integrated into the general student population and their problems are solved through the usual channels. Various other departments offer additional services: Transportation Department provides free on-campus transportation with wheelchair lifts through Dial-a-Ride, (telephone 685-1511), UW Night Ride (after 6 p.m., telephone 799-4151).

Additional information is available from Disabled Student Services, 448 Schmitz, Box 355839, 543-8925 (Voice/TT).

Student Health Insurance Program

An accident and sickness insurance plan is available to matriculated University students (Seattle campus) and their dependents on a voluntary basis. A student may enroll in the plan at the time of registration each quarter. The appropriate premium must be paid by the quarterly tuition due date. Brochures describing the insurance eligibility, coverage, and costs are available at the Student Insurance Office, 466 Schmitz, telephone (206) 543-6202, Hall Health Center, HUB, and information window in Schmitz Hall.

The University also sponsors a field-trip accident insurance plan. Application forms may be requested from the Risk Management Office, 22 Gerberding, Box 351276, telephone (206) 543-3419.

Insurance for Foreign Students

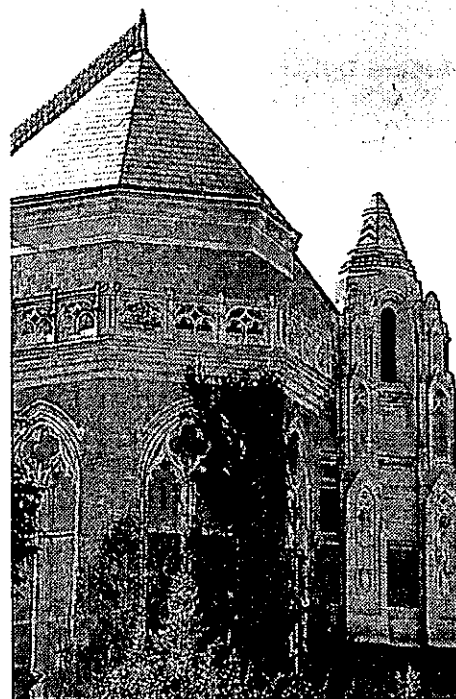
All students from foreign countries are required to have a health-and-accident insurance policy in force while registered at the University. This may be achieved by purchasing either the student accident and sickness insurance offered through the University or other coverage, of which proof must be furnished to the International Services Office and for which an insurance waiver must be obtained. To avoid cancellation of registration, international students must pay tuition and either pay for the University-sponsored insurance or have a waiver on file by the tuition due date.

International Services Office

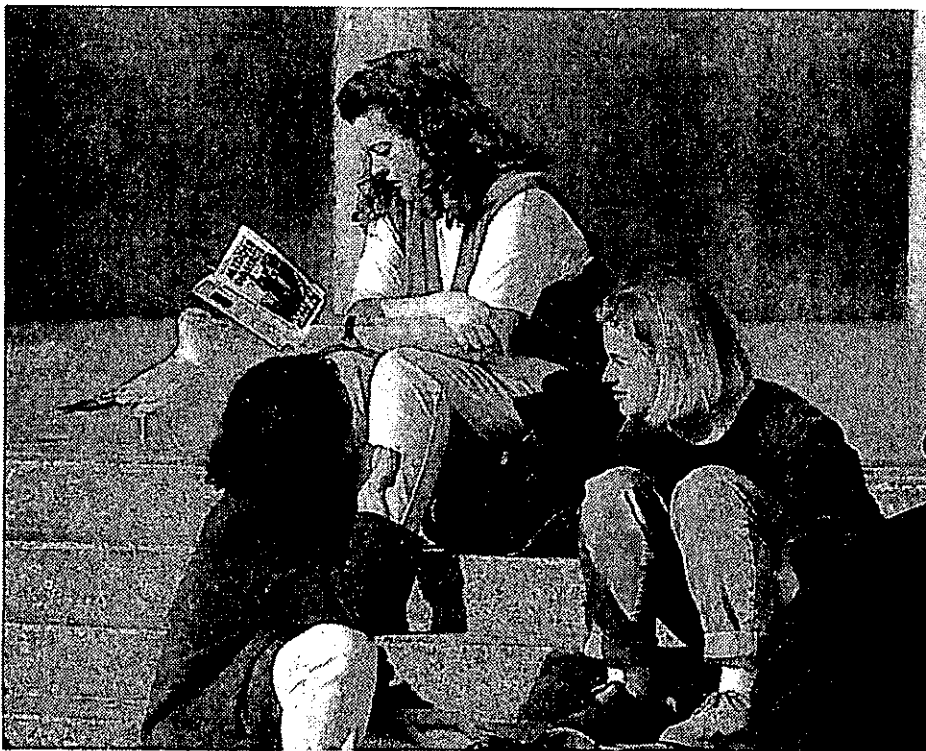
The International Services Office provides assistance to international students, scholars, and faculty in meeting United States Immigration and Naturalization Service regulations dealing with such matters as maintaining lawful status, extensions of stay, transfers of schools/programs, and working authorizations. The Office also provides a formal orientation to the campus and community for new international students and visiting faculty; advice and counsel for educational, financial, and personal problems; dissemination of important and timely information through newsletters and workshops. The Office is located in 459 Schmitz, 543-0841.

Office of Special Services

The Office of Special Services, 460 Schmitz, assists students eligible for veterans' educational benefits, including tuition or fee reductions; advises and monitors students who must meet English As A Second Language requirements; and administers other tuition reduction programs (see Procedures and Fees section below).



THE UNIVERSITY



Office of Student Financial Aid

The Office of Student Financial Aid, 105 Schmitz, administers federal, state, and private financial aid programs designed to help students pay for their education. Assistance is offered in the form of grant aid, scholarships, long-term loans that must be repaid after leaving school, and work opportunities. An information packet describing the different programs, eligibility criteria, and application procedures may be obtained by telephoning, (206) 543-6101.

Both undergraduate and graduate students may apply for aid through the Office of Student Financial Aid; graduate student assistance is generally limited to long-term loans and work opportunities. Information on graduate fellowships, scholarships, and teaching and research assistantships may be obtained from the graduate program coordinator in the individual department or program (see Graduate School section of this catalog).

To be eligible for financial aid, an individual must be a citizen or permanent resident of the United States and be admitted to the University as a matriculated, degree-seeking student. Priority consideration is given to students who apply before the University's financial aid application deadline of February 28 (e.g., February 28, 1997 for the academic year beginning in September 1997).

The Office of Student Financial Aid also administers a short-term emergency loan program for full-time students who find themselves in temporary, severe financial difficulty. University students may take advantage of the short-term emergency loan program without applying for financial aid.

Student Legal Services

Student Legal Services provides legal advice, counseling, negotiating, and court representation in many legal matters. All currently enrolled undergraduate and graduate students are eligible for a free initial consultation. If additional services are needed, there is an hourly charge of \$10, plus a minimal supply fee and court costs, if any. The Office is staffed by third-year

law students supervised by licensed attorneys, including a staff attorney. Students may telephone 543-6486 or visit the Office, 31 Brooklyn Building, Box 354563, 4045 Brooklyn Avenue NE, to make an appointment or to learn more about the Office's services.

Student Publications

Student publications at the University include the *Daily* and the *Student Directory*. The *Daily* is published Monday-Friday mornings throughout the academic year and is distributed on campus without charge. During summer quarter, the *Daily* is published once a week. Any student with an interest in journalism may serve on the *Daily* staff.

Student Union Facilities

The Husky Union Building and the South Campus Center are the principal centers of student activities and programs on the campus.

Student Union Building

The Husky Union Building (HUB) houses a variety of facilities and services for students, faculty and staff members. These include a 478-seat auditorium, a multipurpose ballroom, a barber and hair styling shop, a branch of the University Book Store, several retail food operations, a recreation and amusement games area, a lost-and-found office, a ticket sales office, a newsstand, a self-service post office, and a limited-service bank, three cash machines, three lounges, and a number of student organization offices. Meeting rooms accommodating from 10 to 175 persons are available for registered student organizations.

South Campus Center

The South Campus Center, located at the southern end of campus, offers services and activities similar to those in the HUB. In addition to a student office, conference rooms, and recreation facilities, the center offers indoor and outdoor dining. A newsstand, a University Book Store branch, a barber and hair styling shop, an espresso bar, and a 24-hour cash machine are also available.

Student Activities and Organizations

Student Activities Office

The services provided by the Student Activities Office (SAO) staff include assisting students in understanding University policies and procedures, providing technical help in the planning and conduct of student events, and furnishing information and assistance to student groups or organizations in order that they may represent themselves and their interests in an effective manner. Advisers are available to assist students involved in group activities with budget and program planning, advertising, orientation to campus resources, and leadership and organizational skill development. Underlying the SAO service functions is a desire to provide an environment in which students can learn from their experiences in extracurricular activities as a supplement to their classroom experiences. Additional information about the services is available from the Student Activities Office, 207 HUB, telephone 543-2380.

Student Organizations

Students at the University are encouraged to become active in at least one of the campus's approximately 300 voluntary student organizations, which include honorary, professional, and social organizations; service and coordinating clubs; activity groups; and religious and fraternal organizations. Voluntary student organizations that register with the University receive various benefits and services to assist their respective activities. Additional information is available from the Student Activities Office, 207 HUB, telephone 543-2380.

Associated Students, University of Washington

The Associated Students, University of Washington (ASUW), is a voluntary, nonprofit association of students designated by the University Board of Regents to carry out a variety of student activities and to represent student interests. In order to vote in ASUW elections, hold ASUW office, or be employed by the ASUW, a student must be a member of the ASUW. Membership is open to all students by providing an affirmative answer on the University registration form each quarter.

The ASUW has an annual budget of approximately \$1.3 million, supported by the services and activities fee paid as part of tuition and from program revenue. The government of the ASUW is headed by an eleven-member board of control elected by the student body each year, and one representative from the Graduate and Professional Student Senate. The ASUW maintains agencies and service groups to provide students with a varied program of activities during the school year and nominates students for service on a number of University committees. ASUW services include lecture notes, a poster printing service, Experimental College, bicycle repair shop, and an ongoing film and entertainment series. Questions regarding the ASUW and its services should be directed to either the ASUW Office, 204L HUB, telephone 543-1780, or the Student Activities Office, 207 HUB, telephone 543-2380.

Graduate and Professional Student Senate

The Graduate and Professional Student Senate (GPSS) serves primarily as an advocate for the academic welfare of graduate and professional students. It is composed of representatives elected from each graduate and professional degree-granting unit. Funded from student services and activities fees, GPSS dedicates a portion of its budget each year to direct allocations for departmental student groups and for special programs benefiting students from many

departments. GPSS publishes informational bulletins, monitors legislative issues of impact to graduate students, maintains graduate student representation on University administrative committees, assists with personal or academic grievances and, in general, seeks to represent graduate student issues and concerns within the University community. Questions regarding the GPSS should be directed to either the GPSS Office, 300 HUB, 543-8576, or the Student Activities Office, 207 HUB, 543-2380.

Recreational Sports

The Department of Recreational Sports Programs provides a comprehensive program of over 60 sports and fitness activities designed to meet the diverse needs and interests of students. To provide this service, the Department manages recreation facilities that include the Intramural Activities (IMA) Building, Golf Driving Range, Waterfront Activities Center, outdoor facilities (Denny Field and tennis courts), swimming pool and locker rooms at Hutchinson Hall, and the Practice Climbing Rock. A varied program of intramural sports, co-recreational activities, sports skill classes, club sports, special events, and general recreation is open to every student with a valid student identification card. For more information call the IMA, 543-4590, the Golf Range, 543-8759 or the Waterfront Activities Center, 543-9433.

Non-credit instruction is offered in aerobics, step aerobics, archery, body conditioning, dance (jazz), fencing, first aid and CPR, golf, gymnastics, hydro-aerobics, in-line skating, judo, karate, lifeguard training, racquetball, rock climbing, roller skating, scuba diving, ski conditioning, skiing (dry land), soccer, springboard diving, squash, swimming, tae kwon do, tennis, volleyball, water safety instruction, and weight training. Call 543-2571 for more information.

Club sports exist for aikido, climbing, cycling, fencing, gymnastics, ice hockey, judo, karate, kayaking, kendo, kung fu, lacrosse, rowing, rugby, sailing, scuba diving, skiing, soccer, squash, synchronized swimming, tae kwon do, volleyball, water polo, and water skiing. Call 543-9499 for more information.

Intramural sports are offered for men, women, and men and women combined (Co-Rec) in a variety of activities, including basketball, bowling, flag football, innertube basketball, soccer, softball, swimming, tennis, track and field, ultimate frisbee, and volleyball, as well as a variety of special events. Call 543-8558 for more information.

Student Rights and Responsibilities

Student Conduct Code

The University Board of Regents has adopted a *Student Conduct Code*, which applies to both academic and nonacademic conduct for students while in attendance at the University. The code specifies standards of conduct, jurisdiction for hearing disciplinary matters, and due process. Interested students may obtain copies through either their advisers or the Office of the Vice President for Student Affairs, 476 Schmitz.

Computer Use and Software Copyright Policy

All faculty, staff, and students who use any computer at the University are responsible for using computer resources in an ethical and legal manner. For detailed information see "Staying Out of Trouble" on either the Computing & Information Technologies Web page at http://www.washington.edu/tech_home/ or in UWIN under Computing & Information Technologies; or contact Computing & Communications at 543-5970.

University Policy on Student Education Records

A copy of the University's policy on a student's right to inspect his or her education records and the University's responsibility to maintain the confidentiality of such records is located at each departmental reference station. The policy is filed under the Washington Administrative Code 478-140-010. Copies of the policy are available at the Registration Office, 225 Schmitz.

Sexual Harassment Complaint Procedure

Students, staff, members of the faculty, and other users of University services who have a concern or complaint regarding sexual harassment may contact either the Ombudsman for Sexual Harassment, 543-0283, or the University Complaint Investigation and Resolution Office, 616-2028. Personnel in these offices provide assistance in resolving concerns and complaints.

Office of Minority Affairs

The Office of the Vice President for Minority Affairs provides a variety of services to underrepresented minority students and to students from economically and educationally disadvantaged backgrounds.

These services include statewide recruitment, admissions counseling, tutorial and instructional assistance, and a counseling service that offers academic advising and help with financial aid, housing and other issues related to life on campus. The Office of Minority Affairs (OMA) also maintains three outreach programs: Upward Bound, Early Scholars Outreach, and Educational Talent Search. Upward Bound is a precollege assistance program for low-income and first-generation high school students in the Seattle area; the Early Scholars Outreach Program engages staff and UW students in work that encourages middle school students to begin their preparation for college before they reach high school; Educational Talent Search offers encouragement and assistance to middle and high school students in preparation for education beyond high school.

OMA's Instructional Center (IC) offers extensive academic assistance to students in the Educational Opportunity Program and to others as staffing, time, and space permit. The Instructional Center maintains drop-in centers for mathematics, writing, reading/study skills, physics/engineering, chemistry, biology/natural sciences, and foreign languages. Services are provided in a variety of settings such as group instructional workshops, review sessions, adjunct courses, credit and noncredit classes, and one-on-one tutorials.

Student Support Services (SSS) is a Department of Education sponsored program which provides advising and tutorial support for selected University undergraduates who meet the program's economic and educational eligibility requirements.

The Early Identification Program (EIP) is a graduate school preparation program for minority students interested in earning postbaccalaureate degrees. It particularly encourages students to aim for the doctorate and faculty careers. EIP provides enrichment opportunities, including exposure to research processes, faculty mentors, seminars, and advising, as well as assistance with the graduate school admissions process.

The Ethnic Cultural Center (ECC) is a facility for student-organized events and activities. Twenty-two of the University's minority student organizations use the ECC as their center of activity. The staff of the Center offers students opportunities for the development of organization and leadership skills through the planning and implementation of cultural, social, student government, and career development programs. The Ethnic Cultural Center complex also maintains a theatre and offers opportunities for students interested in creating on-stage productions and other programs.

The Office of the Vice President for Minority Affairs is located on the third floor of Schmitz Hall.



Procedures and Fees

The University and its colleges and schools reserve the right to change the fees, the rules, and the calendar regulating admission and registration; the instruction in, and the graduation from, the University and its various divisions; and any other regulations affecting the student. The University also reserves the right to withdraw courses and programs at any time.

It is the University's expectation that all students will follow the University regulations and procedures as they are stated in the *General Catalog*. Appeals may be filed with the student's Dean or with the Vice President for Student Affairs in nonacademic matters.

Registration

The University provides registration services through STAR (Student Telephone Assisted Registration), a touchtone telephone registration system. This system allows students to register at the University from any touchtone telephone.

Detailed information and procedures pertaining to registration and withdrawal are outlined in the quarterly *Time Schedule*.

Registration Period I

Designed to accommodate currently registered matriculated students and students eligible to register under the Quarter Off Eligibility Policy. Registration Period I occurs during the latter half of the quarter preceding the quarter for which the student is registering. However, currently enrolled students registering for autumn quarter do so in spring quarter.

Registration Period II

Registration occurs after Registration Period I closes and is intended primarily to accommodate new and returning students. Continuing students who fail to register during Registration Period I may register during this phase.

Registration Period III

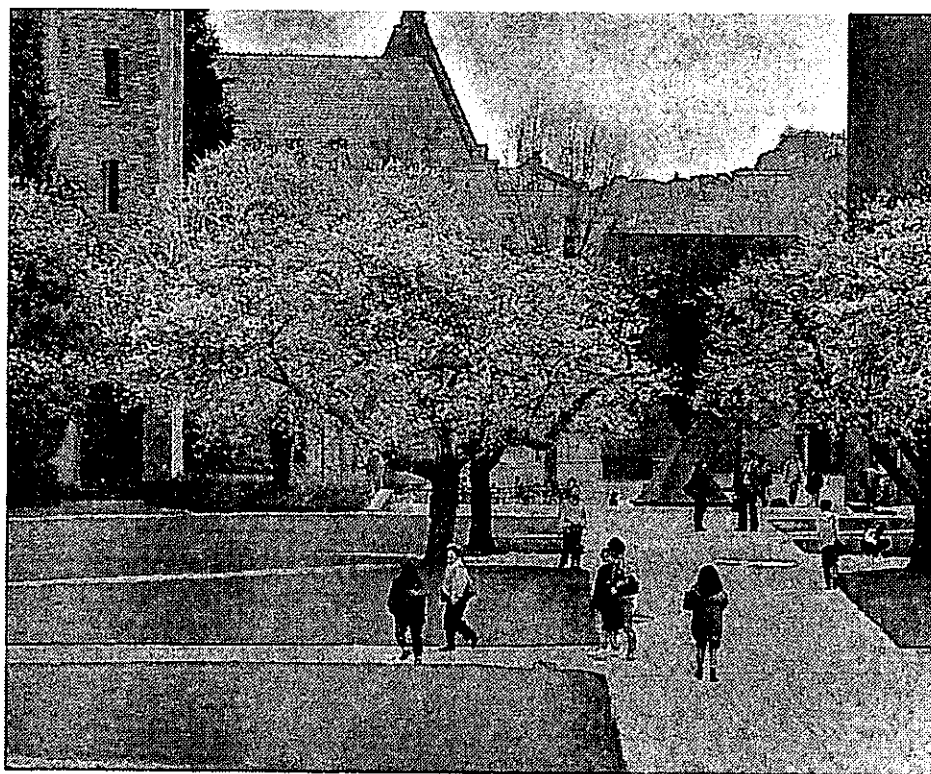
Students who have been admitted may register late, but are charged a late registration fee.

Registration Period IV

Period IV is open for dropping courses through the seventh week of the quarter. No adds or registrations are accepted. A \$20 change fee will be assessed for all registration changes occurring during the same day.

Credits Required for Full- or Half-Time Status Requirements

Some agencies require that a student have full-time status to receive maximum benefits. To be classified as a full-time student by the University, an undergraduate or professional student must register for and complete at least 12 credits per quarter and a graduate student must register for and complete at least 9 credits per quarter. To be classified as a half-time student by the University, an undergraduate or professional student must register for at least 6 credits per quarter and a graduate student must enroll for at least 5 credits per quarter.



Restrictions on Attending Classes

No person, other than a faculty member attending informally with the approval of the instructor, may attend a University course in which that person has not been registered.

An instructor may allow a student to attend his or her class only if the student's name is on the official class list from the Office of the Registrar.

Change of Registration to Drop or Add Courses

1. Registered students may add and drop classes during Registration Periods I, II, or III. Instructions are available in the quarterly *Time Schedule*.

2. All students may add and drop courses through the second week of the quarter and drop courses through the seventh week of the quarter by following instructions in the quarterly *Time Schedule*. A \$20 change fee is assessed for any number of add, drop, or change transactions processed during a given day beginning the eighth calendar day of the quarter. No adds are accepted after the twelfth calendar day of the quarter.

Adding Courses/Permission Guidelines

For reasons of public safety and instructional quality, it is important to limit course enrollment to the approved classroom capacity. The Office of the Registrar monitors course enrollment and accepts student registration in fully enrolled courses according to the following guidelines:

1. Through the second week of the quarter, departments may choose to overload courses up to 115% of the room capacity to offset anticipated student course drops and withdrawals as demonstrated by past registration activity.

Students must secure entry codes from instructors or departments and use STAR for adding closed courses.

However, if enrollment is at 115% of room capacity, registration requests are denied. Students should be informed when receiving entry codes to overload courses, that registration is not guaranteed if enrollment exceeds 115% of room capacity.

If centralized room capacity records do not correctly reflect the actual seating capacity, notification should be made to Room Assignments in the Office of the Registrar.

2. Generally, course adds are not accepted after the second week of the quarter. However, situations may arise that necessitate an exception, such as a student needing a course to graduate in the current quarter. In this case, students must complete a "Late Add Petition" form and obtain the signatures of both the instructor and the department chair. Forms are turned in to the Registration Office, and if approved, the course is added to the student's schedule within two working days. Department chairs should in no case approve a late add after the second week of the quarter if the class is enrolled at 100% of room capacity.

3. An audited course may not be changed to credit registration after the first two weeks of the quarter. Credit courses may be changed to audit through the seventh week of the quarter. A change to audit after the second week of the quarter is treated as a course drop. See below for transcript entry.

Dropping a Course

Undergraduates dropping a course during the first two weeks of a quarter shall have no entry on their permanent academic transcript. If all courses are dropped, then a complete withdrawal date is recorded on the transcript.

A course drop made during the third through the seventh week of the quarter is recorded on an undergraduate student's transcript with a W grade and a number designating the week of the quarter in which the course drop was transacted. A W grade only is recorded on the transcript of graduate or professional students.

A student who does not drop a course officially through STAR or the offering department is given a grade of 0.0.

Students receiving or applying for financial aid should check with the Office of Student Financial Aid, 105 Schmitz, telephone 543-6101, before dropping a class because it may affect their eligibility.

Students receiving veterans' benefits should contact the Office of Special Services when dropping courses.

Complete Withdrawal From the University for a Registered Quarter

Once registered, a student must officially withdraw if he or she later chooses not to attend the University for the registered quarter. Official withdrawal must be made by the fifth day of the quarter for the student to avoid further financial obligation (see Tuition, Fees, and Special Charges for refund information on withdrawals).

1. To withdraw from a quarter, students may complete a Withdrawal Card and submit it in person to the Registration Office, 225 Schmitz or write to the Registration Office, Box 355850, Seattle, WA 98195-5850. Withdrawal forms are available at advising offices and the Registration Office. An official withdrawal is effective the day it is received in the Registration Office, or if submitted by mail, the date of the postmark.

2. Students who drop the last course on their schedules on STAR will be considered withdrawn for the quarter. Students who drop courses beginning the eighth calendar day of the quarter are charged \$20 per day for any course drops.

3. Submission of a graduate On-Leave application does not constitute official withdrawal from the University.

4. Refer to grading section in the Undergraduate Study or the Graduate School: Graduate Study sections.

5. Students receiving veterans' benefits should immediately notify the Office of Special Services of withdrawal.

6. Students with a scholarship or loan awarded through the University should notify the Student Accounts and Scholarships Office or the Student Loan Office.

7. Students who withdraw due to conscription into the armed forces or who are called to active duty military service may be entitled to either a full refund of tuition and fees or academic credit, depending on when in the quarter official withdrawal occurs. Students should contact the Registration Office for complete information.

Additional Information

Address Change

Students are responsible for notifying the Office of the Registrar when their address changes. Call the Address Change Telephone Service at (206) 543-3868 anytime or visit the Registration Office in 225 Schmitz to keep your address current. *The mailing of notices to the last address on record constitutes official notification.*

Residence Classification Requirements

Residence classification information is available from the Graduation and Academic Records Office, 264 Schmitz.

Student Identification Cards

All new students should come to the Student ID Card Center, 229 Schmitz, to be issued a permanent student identification card. Photo identification (such as a driver's license, state ID card, or passport) is required to obtain a student ID card. Returning students who have not retained their previous ID card should obtain

a new one. A quarterly validation sticker is mailed with the registration confirmation to each registered student. The student ID card and attached validation sticker is used for a variety of campus services. It is the student's means of identifying his or her status as a student at the University.

Registered students whose ID cards have been lost or stolen can have them replaced at the Student ID Card Center. Students who request such replacement are charged a nonrefundable fee. Replacement of cards made invalid by changes in a student's name or rendered unusable by normal wear and tear is provided without charge upon return of the original card to the Student ID Card Center. Two pieces of identification (one with a photo) are required to obtain a replacement card.

Cards that have been tampered with or misused may be confiscated by the University agency or department involved, and the incident may be referred to the Office of the Vice President for Student Affairs for appropriate University action.

Transcripts

Official copies of student academic records at the UW must bear the official seal of the University, the signature of the Registrar, and the date of issue.

Transcript Fee

A charge of \$4, payable to the Transcript Office in advance, is required for each transcript.

Transcripts From Other Schools

A transcript covering a student's previous secondary and college education that has been submitted to the University as a requirement for admission becomes part of the official file and is not returned to the student. Any student who desires transcripts of his or her course work undertaken elsewhere must order official transcripts from the institution. The University does not issue or certify copies of transcripts from other institutions.

Veterans and Children of Totally Disabled Veterans and Personnel in the Armed Forces

Information on educational benefits and tuition reduction programs for veterans and their dependents is available from the Office of Special Services, 460 Schmitz.

Veterans and members of the armed forces who apply for admission to the University are subject to the same minimum requirements as regular students and are expected to enroll in accordance with University requirements.

The University's academic programs of study are approved by the Washington State Higher Education Coordinating Board's State Approving Agency (HECB/SAA) for enrollment of persons eligible to receive educational benefits under Title 38 and Title 10 USC.

Tuition, Fees, and Special Charges

Estimated Expenses

The cost of a student's education at the University varies, the amount depending on his or her classification, status as resident or nonresident, and field of study. In computing college costs, a student should consider such additional expenses as insurance coverage, books, and laboratory supplies. Personal expenses (e.g., clothing, laundry, recreation, and transportation), which vary with each individual, as well as between-quarter expenses, should not be overlooked.

The following figures are prepared and updated each year by the Office of Student Financial Aid and reflect modest, but adequate, probable costs for students attending the University during the nine-month academic year. They should be used only as a guide in determining the year's expenses.

	Lives with parents		Traditional		Non- traditional
	Under- graduate	Graduate	Under- graduate	Under- graduate	Graduate
Books	\$ 756	\$ 876	\$ 756	\$ 756	\$ 876
Room and Board	2,211	2,211	5,265	7,458	7,458
Transportation	396	747	396	747	747
Miscellaneous personal expenses	1,893	1,893	1,893	1,893	1,893
Total	\$5,256	\$5,727	\$8,310	\$10,854	\$10,974

Traditional budget: All single undergraduates, without dependents (spouse or children), who are living away from parent's home; married undergraduates, without children, whose spouses are also students.

Nontraditional budget: All graduate and professional students; undergraduates who have children; married undergraduates whose spouses are not students.

	Resident tuition and fees	Nonresident tuition and fees
Undergraduates	\$ 3,138	\$ 9,753
Graduate students	4,932	12,363
Medical and dental students	8,058	20,472

Tuition and fees are subject to change.



PROCEDURES AND FEES

Enrollment Confirmation Deposit

A new or returning former student or a continuing student in a new classification (e.g., undergraduate, postbaccalaureate [fifth-year], graduate) is required to confirm his or her intention to enroll by paying a nonrefundable \$100 Enrollment Confirmation Deposit (not required of students admitted summer quarter). The \$100 is applied toward tuition and fees assessed for the quarter for which the student is determined to be admissible and subsequently enrolls. A student who pays the fee for a given quarter but does not register in that quarter is not entitled to refund except by petition in the situations listed below:

1. A new or returning matriculated student who is unable to obtain courses required for the completion of the degree or certificate program, or courses which are determined by an appropriate academic adviser to be acceptable alternate courses. A written verification from the appropriate academic adviser must be attached to this petition. Such requests for refund must be submitted by Friday of the second week of the quarter.

2. A new or returning matriculated student who, after meeting with an appropriate academic adviser, determines that the program for which admission was granted differs substantially from what the student was led to expect based upon earlier available information, is eligible for a refund of the Enrollment Confirmation Deposit. This petition for refund must be submitted before the student registers for courses and in no case later than the first day of the quarter for which admission has been granted. A written verification from the appropriate academic adviser must be included.

3. A new or returning student who applies by the prescribed deadline for financial aid administered by the University's Office of Student Financial Aid, and who cannot be awarded financial aid adequate to his or her needs as determined by that office, and who is therefore unable to attend the University, is eligible for a refund of the Enrollment Confirmation Deposit. This petition and a copy of the Notice of Award and Acceptance must be submitted no later than two weeks after receipt of notice of the financial aid award.

4. A new or returning student who is unable to attend the University because of pregnancy, disability, or death, or because of being called involuntarily into the military service of the United States or into civil duty, may be refunded the Enrollment Confirmation Deposit. Documentation is required.

Fee Payment

An obligation to pay tuition and fees in United States dollars is incurred when a student registers. A fee statement is mailed to the student's address on file in the Registrar's Office.

Payment of this obligation is due by Friday of the third week of the quarter. Nonpayment of tuition and fees by the due date results in: (1) charge of \$10 to \$30 for late payment, if payment is received within the one-week late payment period; (2) cancellation of registration, if payment is not made by the eighth Wednesday of the quarter. One-half of tuition is assessed when registration is canceled for nonpayment of tuition and fees. The Summer Quarter Bulletin and *Time Schedules* should be consulted for fees and fee payment schedule applicable to summer quarter only.

When the payment is not in conformance with the tuition and fee billing, specific instructions on how the payment is to be applied must accompany the payment. In the absence of instructions, the University makes a reasoned interpretation of the student's intent and accounts for the funds accordingly. The student number must be specified on all payments.

Quarterly Tuition Rates Effective Autumn Quarter 1996

Undergraduate

(including nonmatriculated and fifth-year)

	Resident	Nonresident
2 credits (minimum)	\$ 206	\$ 651
3 credits	311	976
4 credits	416	1,301
5 credits	521	1,626
6 credits	626	1,951
7 credits	731	2,276
8 credits	836	2,601
9 credits	941	2,926
10-18 credits	1,046	3,251
Technology Fee*	40	40
Additional fee per credit for more than 18 credits	96	316

Graduate and Law

2 credits (minimum)	469	1,176
3 credits	704	1,765
4 credits	939	2,354
5 credits	1,174	2,943
6 credits	1,409	3,532
7-18 credits	1,644	4,121
Technology Fee*	40	40
Additional fee per credit for more than 18 credits	222	576

Medical and Dental

2 credits (minimum)	409	1,049
3 credits	616	1,574
4 credits	823	2,099
5 credits	1,030	2,624
6 credits	1,237	3,149
7 credits	1,444	3,674
8 credits	1,651	4,199
9 credits	1,858	4,724
10 credits	2,065	5,249
11 credits	2,272	5,774
12 credits	2,479	6,299
More than 12 credits	2,686	6,824
Technology Fee*	40	40

*Prorated for part-time students

†Does not apply to first professional law students.

Fees are subject to change without notice.

Tuition rates for resident and nonresident students apply to the academic year (autumn, winter, and spring quarters). Summer quarter tuition is listed in the Summer Quarter Bulletin and *Time Schedule*. Except for students in the Schools of Dentistry or Medicine, nonresident students are charged resident tuition during summer quarter.

Tuition charges are based on student classification, e.g., undergraduate, graduate, or professional, and not on course level.

Fees listed above do not apply to students registered through UW Extension. See the UW Extension Bulletin for their fee structure.

Special Course and Laboratory Fees

The amounts listed above cover normal University charges for course registration. Some courses, however, have extraordinary expenses associated with them, and in such cases the University may charge additional fees in amounts that approximate the added instructional or laboratory costs.

Other Fees

Auditors: There is no reduction in fees for auditors.

Admission Application Fees: Undergraduate, \$35; Graduate, \$45; Medicine, Dentistry, \$35; Law, \$50. Former students returning in the same classification, \$35.

On-Leave Registration Fee: This fee of \$35, charged graduate students only, provides for a maximum On-Leave period of four successive academic quarters or any part thereof and is not refundable.

Late Registration/Reregistration Fees: A late registration service charge of \$25 is assessed when a student registers for the first time after the last scheduled day of Period II registration and through the tenth day. Students registering after the tenth day pay a \$75 late registration fee. A student who must reregister as a result of a cancellation for nonpayment of tuition must also pay a \$75 fee. Waiver or refund of the registration service charge may be petitioned in the Registration Office. Waiver or refund of the \$75 reregistration fee may be petitioned in the Student Accounts and Cashiers Office.

Change of Registration Fee: A charge of \$20 is made for any number of add, drop, or change transactions processed during a given day beginning the eighth calendar day of the quarter.

Transcript Fees: A charge of \$4, payable to the University's Transcript Office in advance, is required for each transcript.

Thesis and Dissertation Fees: Publication binding fee, \$25; dissertation microfilming fee, \$52; abstract-only microfilming fee, \$50; optional copyright service fee, \$35.

Replacement Fees: Duplicate diploma, \$10; student identification card, \$5 (non-photo), \$10 (photo).

Credit by Examination Fee: In order to obtain credit for independent study, a regularly admitted and currently enrolled student may take an examination prepared by the department concerned. The fee is \$25 per examination. Appropriate forms must be obtained from the Graduation and Academic Records Office, 264 Schmitz.

U-PASS Fee: A U-PASS validation sticker is mailed quarterly with a student's registration confirmation. The U-PASS is valid on all Metro and Community Transit routes at all times and provides parking privileges to carpools, riding privileges to vanpool and Night Ride passengers, and merchant discounts. The quarterly fee of \$27 is included on the tuition bill. Students who do not wish to participate in the U-PASS program must return the validation sticker to the University by the tuition payment deadline. The sticker can be returned by mail in the return envelope provided, or mailed with the tuition payment, or returned in person at the Student Accounts and Cashiers Office. For further information consult the quarterly *Time Schedule*.

All fees are subject to change without notice.

Cancellation of Tuition

Registered students must pay full tuition and fees. Tuition may be canceled or reduced if a student makes an official withdrawal or drops a course during the period specified by state statute. Refunds are given when a cancellation or reduction results in an overpayment.

Continuing Students

1. A student who withdraws on or before the seventh calendar day of the quarter does not pay tuition.
2. A student who withdraws after the seventh calendar day through the thirtieth calendar day of the quarter must pay one-half tuition.
3. A student who withdraws after the thirtieth calendar day must pay full tuition.

New and Returning Students

1. A student who withdraws on or before the seventh calendar day forfeits the \$100 Enrollment Confirmation Deposit but does not pay the regular tuition.
2. A student who withdraws after the seventh calendar day through the thirtieth calendar day of the quarter must pay one-half tuition. The \$100 Enrollment Confirmation Deposit is applied toward payment of tuition.
3. A student who withdraws after the thirtieth calendar day of the quarter must pay full tuition. The \$100 Enrollment Confirmation Deposit is applied toward payment of tuition.

Fee Forfeiture

A student who does not completely withdraw but is dropping one or more courses may be eligible for lower tuition, depending on the total number of credits remaining after the course drop and on the time period when the drop was made. Tuition for students making a course drop on or before the seventh calendar day of the quarter is determined by the total credits remaining. Tuition for students making a course drop after the seventh calendar day through the thirtieth calendar day of the quarter is computed on the total credits remaining plus one-half the difference between the old tuition and the new tuition. There is no cancellation or reduction in tuition for courses dropped after the thirtieth calendar day of the quarter.

Fee Refund

When a fee payment is made by check, a waiting period is required before a refund can be authorized. An application for refund may be refused, unless it is made during the quarter in which the fees apply. A student who withdraws for disciplinary reasons forfeits all rights to refund or cancellation of any portion of his or her fees.

Financial Obligations

The Comptroller is authorized to place a hold (administrative) on the records of any student who fails to pay amounts due the University.

Until this hold is cleared, the University (1) does not release the student's record or any information based upon the record, (2) does not prepare transcripts or certified statements, and (3) denies registration.

In cases of serious financial delinquency, the Comptroller, with the consent of the Registrar, may order that a student's registration be canceled and that privileges of attendance be withdrawn.

Tuition and fees not paid by the end of the academic quarter are subject to an interest charge of 1 percent per month, or a fraction thereof (12 percent APR), beginning the month following the end of the quarter.

An administrative hold or cancellation also may occur when a student has not complied with other University rules, procedures, or obligations. The hold may be placed on the student's record by the authorized University office responsible for enforcement of the rule, procedure, or obligation involved. The student is not permitted to register for any subsequent quarter or to obtain a transcript of his or her record or a certified statement except on the written release of the office that placed the hold.

Tuition Exemptions or Reductions

Faculty/Staff and Washington State Classified Employee Tuition Exemption Programs

Eligible faculty, staff, and state classified employees admitted to the University may enroll for up to 6 credits each quarter under these tuition exemption programs. Because such students are registered on a space-available basis, they must register after other students. The quarterly *Time Schedule* lists registration dates when students enrolling under these exemption programs may register. Eligibility information may be obtained from either the Staff Training and Development Office or the Registration Office.

"Access" Program for Older Adults

The UW allows Washington residents 60 years of age or older to audit certain courses on a space-available basis. Students who attend the University under the Access Program are limited to two courses per quarter. There is a nominal registration fee. As auditors, students do not receive credit, participate in discussions, complete laboratory work, or take examinations.

Tuition Reductions

The following categories of students may be eligible for reduced tuition and fees. Students in these categories may contact the offices shown either for information on the reduction or to obtain the appropriate form to apply for the reduction. Most of the reductions must be renewed before the beginning of each quarter. The various categories of reductions are established by legislative mandate and may be revoked by the legislature at any time.

Category

Contact Office

Active duty military assigned to Washington and their children and spouses

Office of Special Services, 460 Schmitz

Children of persons who were POWs or MIAs

Office of Special Services, 460 Schmitz

Children of Washington law enforcement officers or firefighters who died or became totally disabled in the line of duty

Office of Special Services, 460 Schmitz

UW faculty members and their children and spouses who are not Washington State residents

Academic Personnel Office, 85 Gerberding

Immigrants holding a refugee classification who have been in the United States less than one year

Office of Special Services, 460 Schmitz

Senior citizens under the Access Program

UW Extension, (206) 543-2320

UW staff members and their children and spouses who are not Washington State residents

Office of Special Services, 460 Schmitz

TA/RAs with half-time appointments

Graduate School, 201 Gerberding

Veterans who served in the Persian Gulf combat zone after January 17, 1991 (Expires June 30, 1997)

Office of Special Services, 460 Schmitz

Veterans who served in Southeast Asia during the period of August 5, 1964-May 7, 1975 (Expires June 30, 1999)

Office of Special Services, 460 Schmitz

Medical students in the WAMI Program

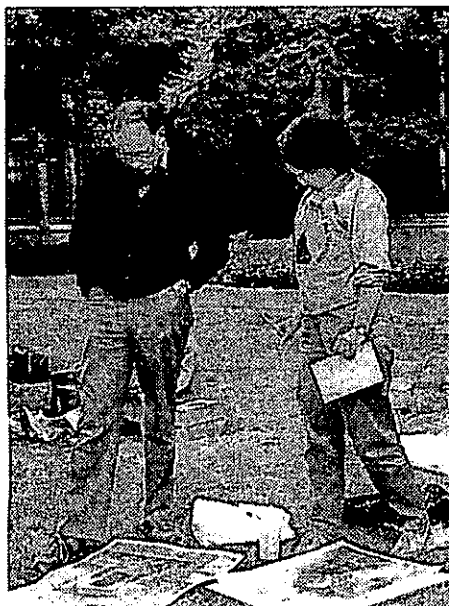
School of Medicine, Office of Academic Affairs, A320 Health Sciences

Award recipients under the Washington State Scholars and Washington Award for Vocational Excellence (WAVE) programs

Office of Student Financial Aid, Outreach Services, 180 Schmitz

Students participating in the WICHE Program

Student Accounts and Cashiers Office, 129 Schmitz





Undergraduate Education

Dean and Vice Provost

Frederick L. Campbell
314 Gerberding

Associate Vice Provost

Louis Fox

Associate Dean

Debra Friedman

New-Student Programs

34 Communications

Director

Michaelann Jundt

Assistant Director

Meg Estep

Orientation Program

Orientation is the opportunity to get ready for life at the University of Washington before classes actually begin. Along with their new classmates, incoming students come onto campus for one or two days and are introduced to campus life by student orientation leaders. Students have found that orientation offers them the opportunity to hear firsthand about the experiences of current students at the UW, as well as about strategies to help them make the most of their college experience. In addition, students register for classes, hear about different majors, make connections with other students, and begin to explore the wealth of campus resources and opportunities available at such a large institution.

Freshman Interest Groups

Directors

Michaelann Jundt
Ken Etzkorn

Freshman Interest Groups (FIGs) make the University smaller and less imposing by providing incoming freshmen a chance to meet, discuss, and study with other freshmen who have similar interests. The program is offered only autumn quarter of a student's freshman year.

Each FIG consists of 20 to 24 students who share a cluster of two or three courses organized around a common theme, such as pre-engineering, international relations, or the ancient world. In addition to sharing these classes, students in each FIG attend a weekly proseminar led by a peer adviser, who is a junior or senior with a similar academic background. These weekly meetings create a learning community, introducing students to campus resources, computing and technology, and social issues encountered by new students. Of equal importance, FIGs help with adjustment to college by providing a support group of other freshmen as well as a resource in the knowledge and experience of a peer adviser.

Freshman Seminars

A Freshman Seminar is a one-credit course taught by a senior UW faculty member. The seminar topics cover a

vast range of disciplines and are based on each faculty member's area of research or specialty study. The course's limited enrollment of only 12-15 students gives freshmen the opportunity to participate in a small, discussion-oriented class. This allows first-year students the opportunity to make connections with faculty early in their college careers, and to explore topics of interest in a casual environment. Students can enroll in a Freshman Seminar every quarter of their freshman year.

Edward E. Carlson Leadership and Public Service Office

34 Communications

Director

Kim Johnson-Bogart

The Carlson Leadership and Public Service Office coordinates service and service-learning programs that enable students to volunteer with community-based human service or environmental agencies. Opportunities include tutoring or mentoring school children individually, in small groups, or as part of a course.

The Internship program provides students with information about local, national, and international internships; how to obtain an internship; and how to arrange credit.

A collaborative effort of the UW Office of Research and Undergraduate Education, the Undergraduate Research Program pairs undergraduate students with faculty to work in one-to-one mentorships on a research project. Students have the option to enroll for credit. Students and faculty compete for stipends.

Scholarship Program

34 Communications

Coordinator

Lori Colliander

The Undergraduate Scholarship Program provides information to current UW-undergraduates about various merit-based scholarships, including quarterly newsletters, scholarship workshops, and applications and information.

Curriculum Planning and Special Projects

Director

Ken Etzkorn

Undergraduate Advising Center

9 Communications

Director

Richard Simkins

Associate Director

Richard Newcomb

Academic Counselors

Diccon Conant
Nancy Hennes
Janet Kime
Beret Kischner
Lindsay Michimoto
Kelli Jayn Nichols
Deborah Prince
Jeanne Sauvage

Students who do not make a definite choice of major when entering the University are designated premajor students. An adviser in the Undergraduate Advising Center will assist them in designing a program of studies that will meet general requirements and provide them with information about possible major fields. The Undergraduate Advising Center also provides the following: assistance in exploring academic options; information about degree programs; preprofessional advising for such areas as medicine, dentistry, law; options for students on academic probation; preliminary career counseling; a wide range of information on registration, course offerings, degree requirements, and administrative procedures. Premajor students normally select a major by the time they have earned 105 credits. Transfer to a department major from premajor status sometimes requires completion of prerequisite courses, attainment of a minimum specified GPA, or selection by the department from among a group of prospective majors.

University Honors Program

B102 Padelford

Director

John S. Edwards

Associate Director

Randolph Y. Hennes
B102 Padelford

The four-year Honors Program features special counseling, honors courses, honors sections of regular courses, faculty/student colloquia, and opportunities for independent study. It provides expanded opportunities for undergraduate education to those students who show exceptional intellectual promise.

Admission Requirements: To be considered for admission to the University Honors Program at entrance, students must apply during their final high school semester to the Director of Honors. Selection is based on high school records, test scores, and recommendations from the secondary school. Students also may seek admission based on superior academic performance during their freshman year at the University.

Graduation Requirements: The University Honors curriculum consists of two parts: a general education component and a component in the student's major department. The general education component, which satisfies Areas of Knowledge requirements, consists of three sequences of courses, each lasting three quarters. One of these sequences is taken in Western Civilization, one in World Civilization, and one in the Natural Sciences. Each sequence carries 15 credits total. In addition, students complete 4 additional credits of honors seminars.

The second component begins when a student, usually by the junior year, is accepted into a department that offers an honors curriculum. Such a student is graduated "With College Honors" in the appropriate discipline. A student who is not a member of the University Honors Program but who demonstrates superior abilities in a particular field of study may, at the invitation of that department, participate in a departmental honors curriculum and receive a degree "With Distinction" in the major field.

An honors degree can be earned through the following departments and programs within the College of Arts and Sciences: Anthropology; Art History; Asian Languages and Literature; Atmospheric Sciences; Biology; Botany; Chemistry; Classics; Comparative History of Ideas; Comparative Literature; Comparative Religion; Computer Science; Economics; English; General Studies; Geography; Geological Sciences; Germanics; History; International Studies; Japan Studies; Linguistics; Mathematics; Microbiology; Music; Near Eastern Languages and Civilization; Philosophy; Physics; Political Science; Psychology; Romance Languages and Literature; Russian, East European, and Central Asian Studies; Scandinavian Languages and Literatures; Slavic Languages and Literatures; Sociology; Speech and Hearing Sciences; Speech Communication; Women Studies; Zoology.

An honors degree may also be earned through the College of Engineering.



UNDERGRADUATE STUDY

By special arrangement, it is possible for students to complete a degree "With College Honors" in departments not offering a formal honors option.

Interdisciplinary Undergraduate Programs

General Studies

9 Communications

General Studies provides students an opportunity to obtain an interdisciplinary degree. Students may pursue an individually designed "atypical major" or one of several organized interdisciplinary programs.

Requirements for the Bachelor of Arts or Bachelor of Science degree are shown in the Arts and Sciences section of this catalog. Also offered under General Studies are the following: a course in university learning skills (GEN ST 101); independent fieldwork (GEN ST 350); and a general Evening Degree Program through UW Extension with options in the humanities and social sciences.

Comparative History of Ideas

B102 Padelford

Director

John E. Toews

Associate Director

James D. Clowes

Comparative History of Ideas provides for the interdisciplinary study of intellectual history by bringing together thematically related courses from such fields as literature, history, anthropology, philosophy, the arts, and religious studies. Courses within the program have been chosen and designed to explore the history of specific ideas or themes, to examine the history of particular intellectual cultures (Western and non-Western), or to study comparatively the underlying assumptions and attitudes of different intellectual worlds. As a unique approach to liberal humanistic studies, the program provides a solid basis for postgraduate study in, for example, law, administration, medicine, education, journalism, or area studies.

Requirements for the Bachelor of Arts degree are shown in the Arts and Sciences section of this catalog.

Community and Environmental Planning

410 Gould

Director

Dennis M. Ryan

The Bachelor of Arts degree in Community and Environmental Planning (CEP) provides a multi-disciplinary study of several contemporary academic fields and areas of research. These include the study of communities, the analysis of natural and built environments, and the investigation of the theory and practice of planning. The CEP program is designed to foster both student- and community-based undergraduate learning experiences.

Requirements for the Bachelor of Arts degree and course descriptions are shown in the Architecture and Urban Planning section of this catalog.



College Studies Program

B103 Padelford

Director

Keith Benson

Students may fulfill all or part of the general education requirement, in certain schools or colleges of the University, by selecting sequences from the College Studies Program.

(1) A 15-credit College Studies sequence may substitute for a regular 20-credit Areas of Knowledge requirement in one or more of the following:

Visual, Literary, & Performing Arts; Individuals & Societies; the Natural World.

(2) Students who satisfy all three Areas of Knowledge requirements by taking College Studies sequences may then complete their general education requirement by taking an additional College Studies sequence, or any 15 credits of general education courses, in any area.

All individual courses included in College Studies sequences will count for general education credit. Students who are unable to complete a College Studies sequence will thus receive regular general education credit for the courses they do complete.

A list of College Studies Program sequences may be found in the College Studies brochure, available in 9 Communications and in the College Studies Program, B103 Padelford.

Undergraduate Majors

To graduate from the UW, students must complete one of the majors listed below. In many cases, the student need not make a final choice until the beginning of the junior year, although programs with considerable mathematics and science (e.g., engineering and premedicine) include lock-step requirements that are best started early on.

Students can enter some majors directly (e.g., those in Forest Resources, in Ocean and Fishery Sciences, and some in Arts and Sciences), but most students start out as premajors. As premajors, they take courses to fulfill general requirements and admission requirements for the major. Most majors require one or two years of pre-admission course work, although a few require more. Admission to many majors is competitive, which means students may not be accepted even if they complete all the prerequisite course work, depending on their grades and other factors.

The *General Catalog* shows requirements for all majors, but students should see an adviser to ask about changes, course sequences, or new options.

Satisfactory Progress

Students admitted to the University to pursue baccalaureate degrees are expected to make satisfactory progress toward the attainment of the degree and are expected to enter a major and to graduate after completion of a reasonable number of credits.

By the time undergraduate students have completed 105 credits, they must either be accepted in their major or have their premajor status extended temporarily by an adviser.

Students who do not either declare a major or have their premajor status extended by the time they have earned 105 credits will have a "hold" placed against registration beginning the following quarter.

Students must normally graduate with their first baccalaureate degree by the time they have completed 30 credits beyond the credits required for the first degree or concurrent degrees. Departmental advisers may grant extensions beyond the 30-credit limit.

Postbaccalaureate students are expected to be either preparing for admission into a degree program, seeking an additional baccalaureate degree, or working toward a certificate. Students admitted as "postbaccalaureate undeclared" must declare a major by the time they have earned 30 credits beyond their last degree, and once a degree objective has been declared, must make progress toward that degree as evidenced by the courses they have completed satis-

factorily. Advisers may grant extensions beyond the 30-credit limit.

The Committee on Admissions and Academic Standards may terminate a student's enrollment if the student demonstrates lack of academic progress as evidenced by excessive course repeats, course drops, or University withdrawals and cancellations. The student may be reinstated with the approval of the student's college and the committee. EOP students may be reinstated in consultation with the Office of Minority Affairs.

College of Architecture and Urban Planning

Architectural Studies†
Building Construction†
Community and Environmental Planning†
Landscape Architecture†

College of Arts and Sciences

American Ethnic Studies
African-American Studies
Asian American Studies
Chicano Studies
American Indian Studies†
Anthropology
Art†
General Art†
Studio Art†
Ceramic Art†
Fiber Arts (Surface Design/
Weaving Construction)†
Graphic Design†
Industrial Design†
Metal Design†
Painting†
Photography†
Printmaking†
Sculpture†
Art History
Asian Languages and Literature†
Chinese†
Japanese†
Korean†
South Asian Languages†
Thai†
Astronomy
Atmospheric Sciences†
Biochemistry
Biology
Cell and Molecular Biology
Ecology, Evolution, and Conservation Biology
Botany
Canadian Studies
Chemistry
China Studies†
Classics
Classical Studies
Classics
Greek
Latin
Communications†
Institutions and Effects†
International Communication†
Journalism†
New Media Technologies and Policy†
Comparative History of Ideas
Comparative Literature
Comparative Religion (Religious Studies)
Computer Science†
Dance†
Drama

Economics†
English†
Ethnomusicology†
European Studies
French
General Studies (interdisciplinary, student-designed)†
Geography†
Geological Sciences
Germanics
German Language and Literature
German Area Studies
History†
History†
History and Science†
International Studies†
Italian
Japan Studies†
Jewish Studies
Korea Studies
Latin American Studies
Linguistics
Romance Linguistics
Mathematics†
Microbiology†
Music†
Near Eastern Languages and Civilization
Arabic
Hebrew
Near Eastern Civilization
Persian
Turkic
Turkish
Peace and Strategic Studies*
Philosophy
Physics
Political Science†
Psychology†
Religious Studies (Comparative Religion)
Russian, East European, and Central Asian Studies
Scandinavian Languages and Literatures
Danish
Norwegian
Scandinavian Area Studies
Swedish
Slavic Languages and Literatures
East European Languages
Russian Language and History
Russian Language and Literature
Society and Justice†
Sociology†
South Asian Studies
Southeast Asian Studies
Spanish†
Speech and Hearing Sciences†
Speech Communication†
Statistics†
Women Studies
Zoology

School of Business Administration

Accounting Concentration†
Business Administration†
Certificate of International Studies in Business†

School of Dentistry

Dental Hygiene (completion program only)†

College of Education

Requires completion of a bachelor's degree before entry as a graduate student into the Teacher Certification Program in elementary or secondary education.†

College of Engineering

Aeronautics and Astronautics†
Chemical Engineering†
Civil Engineering†
Computer Engineering†
Electrical Engineering†
Industrial Engineering†
Materials Science and Engineering†
Ceramic Engineering†
Metallurgical Engineering†
Mechanical Engineering†
Technical Communication†

College of Forest Resources

Conservation of Wildland Resources
Forest Engineering†
Forest Resources Management
Pulp and Paper Science
Urban Forestry
Wildlife Science

School of Medicine

Clinical Health Services (MEDEX Program)†
Laboratory Medicine†
Medical Technology†
Rehabilitation Medicine†
Occupational Therapy†
Physical Therapy†
Prosthetics and Orthotics†

School of Nursing

Nursing†

College of Ocean and Fishery Sciences

Fisheries
Oceanography

School of Public Health and Community Medicine

Environmental Health†

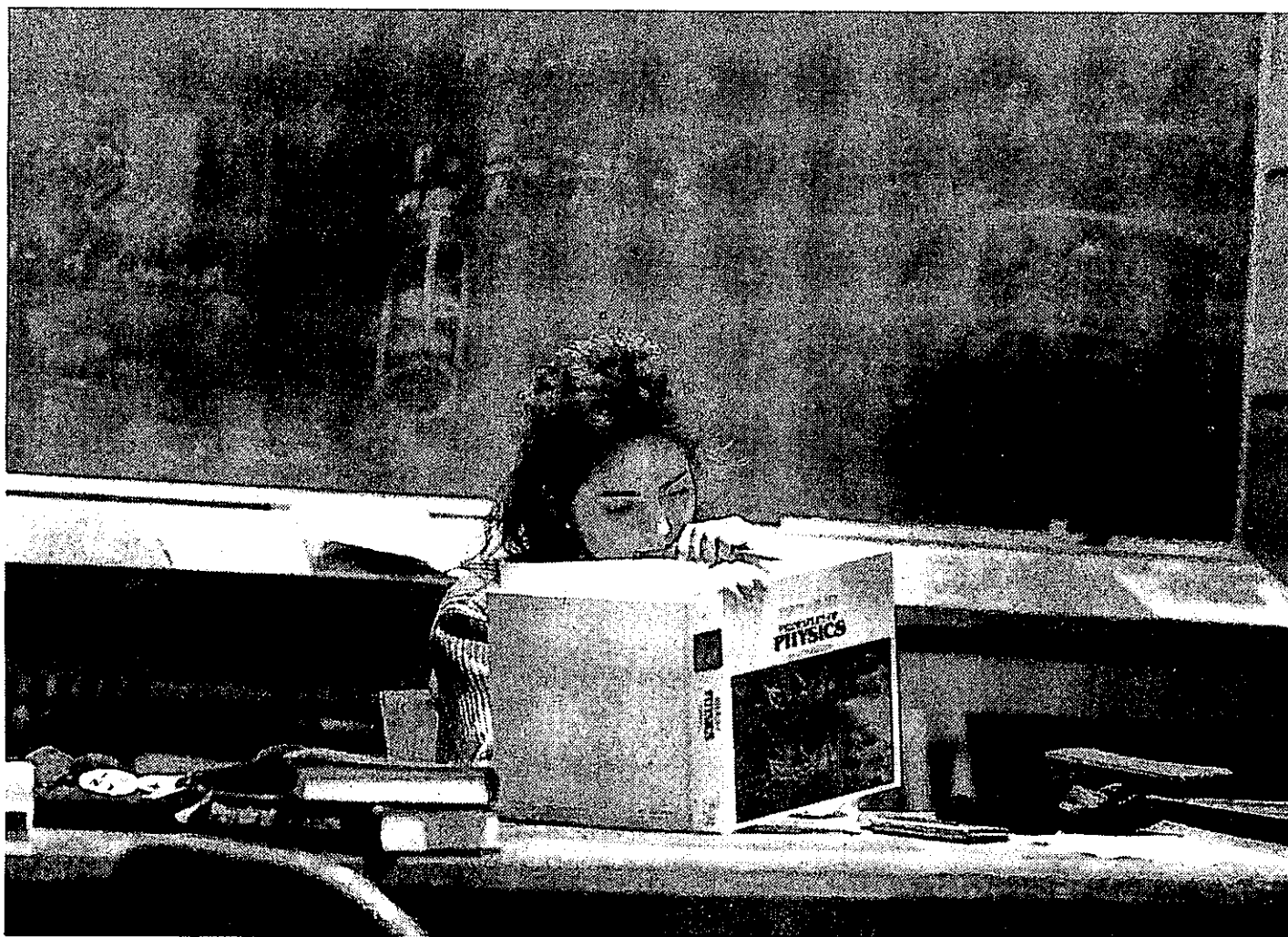
School of Social Work

Social Welfare†

* Offered through General Studies.

† Offered through Anthropology or General Studies

‡ Major has selective admission based on such factors as number of credits earned, prerequisite courses completed, and GPA.



Undergraduate Minors

Undergraduate students have the option of completing a minor. Minors require the completion of at least 25 credits, 15 of which must be taken in residence at the UW. A cumulative GPA of 2.00 is required for courses within the minor. Some departments do not offer minors. Requirements for minors established as of spring 1996 are shown in the academic programs section of this catalog. A list of currently offered minors is available at the Undergraduate Advising Center, 9 Communications.

Undergraduate Degrees

The UW grants the following degrees upon satisfactory completion of appropriate programs of study in the departments, schools, and colleges:

Bachelor of Arts	B.A.	Bachelor of Science in Medical Technology	B.S.Med.Tech.
Bachelor of Arts in Business Administration ..	B.A.B.A.	Bachelor of Science in Metallurgical Engineering	B.S.Met.E.
Bachelor of Clinical Health Services	B.C.H.S.	Bachelor of Science in Nursing	B.S.Nurs.
		Bachelor of Science in Occupational Therapy	B.S.Occ.Therapy
		Bachelor of Science in Physical Therapy	B.S.Phys.Therapy
		Bachelor of Science in Technical Communication	B.S.T.C.
Bachelor of Fine Arts	B.F.A.		
Bachelor of Landscape Architecture	B.L.Arch.		
Bachelor of Music	B.Mus.		
Bachelor of Science	B.S.		
Bachelor of Science in Aeronautical and Astronautical Engineering	B.S.A.&A.		
Bachelor of Science in Building Construction ..	B.S.B.C.		
Bachelor of Science in Ceramic Engineering	B.S.Cer.E.		
Bachelor of Science in Chemical Engineering	B.S.Ch.E.		
Bachelor of Science in Civil Engineering	B.S.C.E.		
Bachelor of Science in Computer Engineering	B.S.Comp.E.		
Bachelor of Science in Electrical Engineering ..	B.S.E.E.		
Bachelor of Science in Engineering	B.S.E.		
Bachelor of Science in Fisheries	B.S.Fish.		
Bachelor of Science in Forest Resources	B.S.F.		
Bachelor of Science in Industrial Engineering ..	B.S.I.E.		
Bachelor of Science in Mechanical Engineering ..	B.S.M.E.		

Admission

The Office of Undergraduate Admissions is responsible for admitting to the University matriculated freshmen, transfer, and postbaccalaureate students, including U.S. and international students. Non-matriculated summer-only students also apply through the Admissions Office. Applications and information, including admissions counseling, are available at the Office of Admissions, 320 Schmitz Hall, 1410 NE Campus Parkway, Box 355840, Seattle, WA 98195-5840; telephone: (206) 543-9686. See section below for Graduate School admission.

Other admission categories such as nonmatriculated students, auditors, and returning former students should contact those program offices, listed under Special Categories of Admission, for further information.

Campus Visits

Students and their parents are encouraged to call, write, or visit the campus. Free campus tours are available without reservations every weekday, except holidays. Tours leave 320 Schmitz Hall at 2:30 p.m. Additionally, the Office of Admissions Student Visitation Program offers prospective freshmen and transfer students the opportunity to be a student for a day, stay overnight in a residence hall with a student host, meet with an admissions counselor and take a guided tour of the campus. Contact the Student Visitation Program at (206) 543-5429 at least four weeks in advance for further details.

Information Sessions

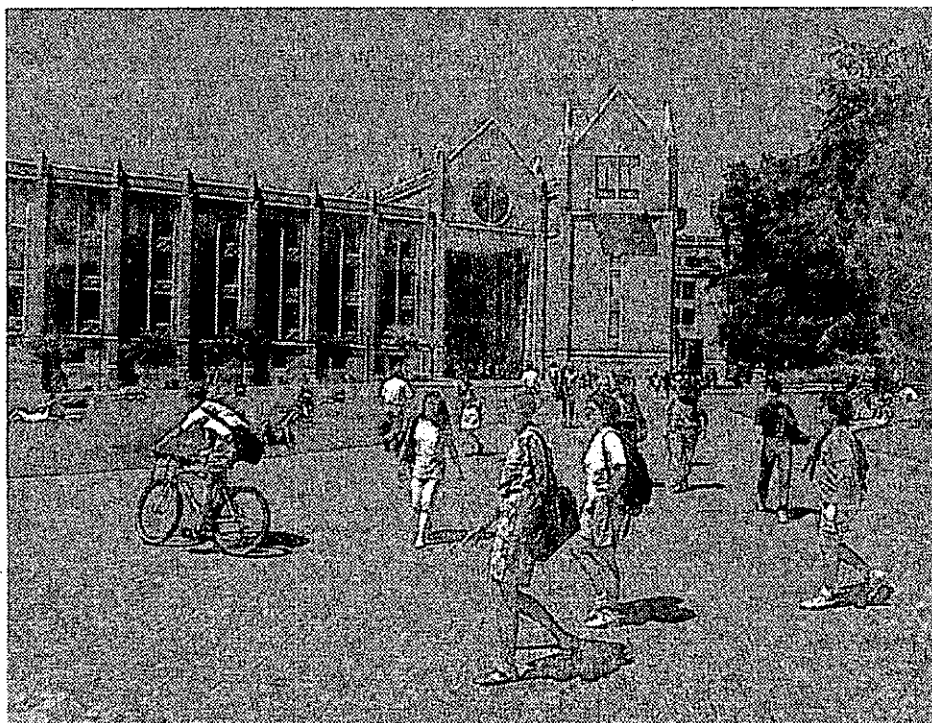
Freshman Information Sessions are held for prospective freshmen and their families every Friday (except holidays) at 1:30 p.m. in the Admissions Office, 320 Schmitz Hall. The information sessions consist of a 20- to 30-minute presentation by an admissions staff member, followed by questions and discussion. Reservations are not required.

General Admission Policy

Eligibility for admission is determined by University faculty and Washington State regulations. In general, admission is competitive, which means that there are more qualified applicants than the University can accommodate. Applicants are evaluated on two principal criteria:

- completion of high school subject requirements and
- academic performance as measured by grade-point average (GPA) and test scores.

Although exceptions are made (see below, Special Admissions and the Appeal of Admission Decisions), the University's policy is to offer admission to those applicants who have completed the subject requirements and who rank the highest in academic performance. A complete discussion of each admission criterion follows.



High School Core Subject Requirements

The first major admission criterion ensures that freshmen and transfer students entering the University have an introduction to the liberal arts and are adequately prepared to succeed in their college careers. The UW faculty and the State of Washington Higher Education Coordinating Board have determined that all applicants are required to complete a minimum level of preparation in six subject areas, known as the high school core subject requirements. Almost all applicants satisfy these requirements through high school courses. Because these are *admission*—not graduation—requirements, they must be completed before enrolling at the University.

The chart on the next page summarizes the number of years of high school study required in each core subject. If a student's high school preparation was insufficient in any subject, there are several ways to make up a high school core requirement before enrolling at the University. Students may present college equivalents or may combine course work at the high school and college level to satisfy a core requirement. *In general, five quarter credits (or three semester credits) at the college level count as the equivalent of one year of high school study.*

If you have taken or are planning to take a course in high school that is not mentioned here but you believe may apply to one of the core requirements, contact the Office of Admissions for advice.

English Core Subject Requirements for Students from Non-English-Speaking Countries

Immigrant, refugee, or international students from non-English speaking countries must satisfy the same core subject requirements as other applicants. In certain cases, however, a native language other than English can be used to satisfy the foreign-language requirement. For more information about alternative routes for satisfying the English requirement, contact the Office of Admissions and request *Undergraduate Admissions Pamphlet #3: Guidelines for Applicants Whose First Language Is Not English.*

Academic Performance

The second major admission criterion is the applicant's academic performance on grades earned in courses and scores on national admission tests. To be *considered* for admission, applicants must have achieved a minimum, cumulative GPA of 2.00. While there is no minimum GPA that will guarantee admission, applicants should note that admission is competitive and, therefore, a GPA *well above* a 2.00 will be required.

Admission Index

To determine an applicant's competitive standing for admission, the University uses a system based on a student's probability of academic success, to calculate an Admission Index (AI) which is used to rank each student. The AI is based on two factors—GPA and test scores—with GPA being the predominant factor.

Freshman Admission

Although the Admission Index ranges from a low of 0 to a high of 100, the state-mandated minimum to qualify for routine freshman admission to the UW is a 28 AI. The UW typically uses a higher AI as its minimum for admission because the number of qualified applicants exceeds the number of spaces available for new students at the UW.

Transfer Admission

There is no state-mandated minimum for routine transfer admission, and the minimum AI ranking required for admission varies from quarter to quarter, depending on the number of applicants and the University's enrollment. Applicants needing more information are encouraged to obtain a *Transfer Application Packet* from the Office of Admissions or contact the office for a counseling appointment.

UNDERGRADUATE STUDY

High School Core Subject Requirements

If taken in high school:

If made up through college course work:*

ENGLISH	<p>4</p> <p>Four years of study are required, at least three of which must be in composition and literature. <i>One</i> of the four years may be satisfied by courses in drama as literature, public speaking, debate, journalistic writing, business English, or English as a Second Language (ESL). (English courses taken in foreign countries are considered ESL, except those taken in Australia, Canada, Ireland, New Zealand, and the United Kingdom.) Courses that are generally not acceptable include those identified as remedial or applied (e.g., developmental reading, remedial English, basic English skills, review English, yearbook/annual, newspaper staff, acting, library).</p>	<p>For the composition/literature component, generally any course with an English or Writing prefix is acceptable. (However, courses such as developmental or speed reading, vocabulary, or remedial English are not acceptable.) <i>One</i> of the four years may be satisfied by a college course in speech, drama as literature, journalistic writing, business English, ESL, or engineering/technical writing.</p>
MATHEMATICS	<p>3</p> <p>The mathematics admission requirement stipulates that applicants attain a minimum level of study in mathematics, <i>in addition</i> to completing the specified number of years. Three years of mathematics study are required, at least at the level of algebra, geometry, and advanced (second-year) algebra. (Preferably, the second year of algebra included a component of introductory trigonometry, but this is not mandatory.) More advanced mathematics courses are recommended, such as trigonometry, mathematical analysis, elementary functions, and calculus. Arithmetic, pre-algebra, business mathematics, and statistics courses will not count toward the requirement. An algebra course taken in the eighth grade may satisfy one year of the requirement if second-year algebra is completed in high school.</p>	<p>If your high school preparation in mathematics was insufficient, you must complete <i>one</i> of the courses listed below:</p> <ul style="list-style-type: none"> • A course in intermediate algebra. At UW Extension, as well as at many community colleges in Washington, MATH 101 is the necessary course. The course must be completed with a grade of 'C' (2.0) or better, <i>even though it does not transfer to the UW as college credit and the grade earned in the course is not used in computing the transfer GPA.</i> • MATH 104 (Trigonometry) or its equivalent. The course must be completed with a grade of 'C' (2.0) or better. • MATH 107 (Mathematics: A Practical Art) or its equivalent. The course must be completed with a grade of 'C' (2.0) or better. • Mathematics courses with intermediate algebra as a prerequisite (except statistics courses). This includes any higher-level math course such as elementary functions, calculus, and beyond.
SOCIAL SCIENCE	<p>3</p> <p>Three years of study are required in history or in any of the social sciences, e.g., anthropology, contemporary world problems, economics, geography, government, political science, psychology, sociology. Credit awarded for student government, leadership, community service, or other applied or activity courses will not count toward the requirement.</p>	<p>Courses in the social sciences—e.g., anthropology, economics, ethnic studies, history, philosophy, political science, psychology, sociology—will count toward the requirement.</p>
SCIENCE	<p>2</p> <p>Two years of science are required, of which one full year—both semesters in the same field—must be completed in the basic principles of biology, chemistry, or physics, with a laboratory experience. The second year of science may be completed in any course that satisfies your high school's graduation requirement in science. Two years of agricultural science is equivalent to one year of science.</p>	<p>College science courses with a lab will count toward the laboratory science portion of the requirement. Any course in astronomy, atmospheric science, biological structure, biology, botany, chemistry, environmental science (but not environmental studies), genetics, geology, oceanography, physical anthropology, physical geography, physics, or zoology will count toward the second-year requirement, as will introductory courses in biological or physical science.</p>
FOREIGN LANGUAGE	<p>2</p> <p>Two years of study are required. The two years must be devoted to a single foreign language and must be in sequence, with no repetition of any prior term of study and without a reduction in what would normally be a full, second year of study. Any natural language that has been formally studied may be used to satisfy this requirement, including American Sign Language (ASL, the language of the deaf community), and languages no longer spoken, such as Latin and ancient Greek. However, neither computer "languages" nor forms of deaf signing aside from ASL are acceptable. A foreign language course taken in the eighth grade may satisfy one year of the requirement if the second-year course is completed in high school.</p> <p><i>Note: The foreign-language admission requirement will be considered satisfied for students from non-English-speaking countries who entered the United States educational system at the eighth grade or later.</i></p>	<p>For purposes of admission, each standard language course in college is considered equivalent to one year in high school. Applicants who have never studied a foreign language will need to complete ten quarter credits (two terms) of a single foreign language. However, an applicant who studied French for one year in high school needs to complete only the second quarter (e.g., FRENCH 102) or the second semester of a first-year language sequence. Of course, a student may prefer to begin with 101 to refresh his/her memory. (The UW's Summer Quarter offers intensive foreign language programs to enable students to complete ten to fifteen credits in one quarter, but these programs are not normally recommended for students with little background in languages.)</p> <p>A student who believes s/he has acquired sufficient knowledge of a foreign language without formal study should contact the Office of Admissions to arrange for an examination.</p>
THE ARTS	<p>1/2</p> <p>One-half year or one trimester of study is required in the fine, visual, or performing arts, to be chosen from art appreciation, band, ceramics, choir, dance, dramatic performance and production, drawing, fiber arts, graphic arts, metal design, music appreciation, music theory, orchestra, painting, photography, print making, and sculpture. Courses generally not acceptable include architecture, color guard, creative writing, drafting, fashion design, interior design, sewing, and woodworking.</p>	<p>Two quarter credits (2 semester credits) chosen from any of the following subjects will satisfy the requirement: art, art history, cinema/filmmaking, dance, music, or photography; any course in drama except drama as literature courses. Courses in architecture are generally not acceptable, except for those in architectural history.</p>
ELECTIVES	<p>1/2</p> <p>Electives are courses in the six subject areas (defined above) in which you have completed more than the minimum number of years. One-half year of study is required, to be chosen from the six subject areas defined above.</p>	<p>Two quarter credits or 1.5 semester credits chosen from the six subject areas described above count toward this requirement.</p>

*In general, 5 quarter credits (or 3 semester credits) at the college level count as the equivalent of one year of high school study.

Freshman Admission

In general, a freshman is anyone who has not attempted college course work *after leaving high school*. In addition, see information below on the Running Start Program.

See the General Admission Policy section above regarding high school core subject requirements and the Admission Index.

GPA and Test Scores

GPA: A GPA based on a 4.0 scale is calculated for every applicant.

Test scores: Applicants for freshman admission are required to submit scores from one of the following tests:

- Scholastic Assessment Test (SAT I)
- American College Test (ACT).

If an applicant submits more than one set of scores from the same test, or scores from different tests, the *highest combined score from a single test date* will be used. (In other words, the best mathematics score from one test date will not be combined with the best verbal score from another test date.)

Supplemental Admission Factors

The University seeks to admit students with outstanding academic preparation and therefore encourages students to enroll in rigorous courses throughout high school. Applicants with excellent grades and admission test scores are the most competitive for admission; however, the University recognizes that other factors—such as a significant improvement in the GPA from freshman to senior year of high school—can be important in assessing a student's likelihood of success in college, even though they are not reflected in the overall GPA.

The Office of Admissions looks for such evidence of academic strength by examining the files of resident applicants whose Admission Index rankings fall within the range of approximately mid-40s through the mid- to upper-50s. These applicants receive an in-depth review of their course work along with an evaluation of supplemental factors such as documented artistic talent.

In considering the applicants falling within the designated AI range, the Admissions Office looks for:

- completion of a substantial number of academic courses beyond the required minimum;
- enrollment in Advanced Placement, International Baccalaureate, Running Start (college course work), or honors courses;
- a pattern of GPA improvement during the high school years;
- persistent evidence of an unusually competitive grading system in the high school; and
- documentation showing exceptional academic achievement or artistic talent.

Using these criteria, admission is offered to the applicants deemed to be the best qualified.

Running Start Program

The Running Start Program was authorized by the Washington legislature as part of the governor's "educational choice" program. The program allows 11th and 12th grade students to enroll in certain colleges for college credit.

There are no arrangements for high school students to take courses at the UW as Running Start participants.

The policies described on this page concern only admission and the transfer of credit as they affect Running Start participants coming to the UW from other colleges.

A Running Start applicant is someone who applies to the UW while participating in the Washington State Running Start Program. Students who matriculate (enroll to earn a degree) at another institution after leaving high school are not considered Running Start applicants.

Admission: High School Core Subject Requirements

Each applicant must satisfy UW high school core subject requirements for admission by completing the appropriate high school or college courses. See pages 23-24 for a complete discussion of these requirements.

Transfer Credit Policy

The UW grants full transfer credit for college-level Running Start courses recorded on a college transcript. All UW restrictions on transfer credit apply, as listed in the Academic Credit section of this catalog.

Scholarships

Running Start students are eligible for freshman scholarships, no matter how many college credits they have or will have completed. The only requirement is that they must enter the UW with their high school class.

Application Filing Dates

Running Start participants seeking admission for autumn or summer/autumn:

- Apply by February 1 if they will have taken **fewer than 40** college credits by the freshman deadline (February 1) of their senior year.
- Apply by April 15 if they will have taken **40 or more** credits by the freshman deadline of their senior year.

Transfer Admission

In general, a transfer applicant is someone who has attempted college credit *after leaving high school*. In addition, please see the section directly above regarding Running Start.

Transfer applicants are required to complete the high school core subject requirements described above under General Admission Policy.

Admission Index

Except for those qualifying for admission under the Direct Transfer Agreement (see below, Direct Transfer Agreement with Washington State Community Colleges), admission is based on the Admission Index (see above, under General Admission Policy).

Test Scores

Applicants for transfer admission, except for those qualifying under the Direct Transfer Agreement, are required to submit scores from one of the following tests:

- Scholastic Assessment Test (SAT)
- American College Test (ACT)
- Washington Pre-College Test (WPCT). WPCT must have been taken by June 1, 1989 to be used for admission purposes.

Although it is sometimes possible to be admitted to the UW without submitting test scores (see the chart below), it is advisable for all applicants to submit scores. Because minimum admission criteria vary from quarter to quarter, it is not possible to predict exactly what college GPA may result in admission. Submitting test scores will not hinder someone's chances for gaining admission, but neglecting to submit scores may hurt an applicant's chances for admission.

When students submit scores from more than one test or multiple scores from the same test, the Office of Admissions always uses the *highest combined score from a single test date*. (The best mathematics score from one test date will not be combined with the best verbal score from another test date.)

The UW's Office of Educational Assessment (OEA) offers a locally-scored Institutional SAT and ACT for applicants who did not take a pre-college test while in high school or those who wish to improve their score. The test schedule is published annually and is available upon request from the Office of Educational Assessment (543-1170). Space is limited and students are urged to register early for the desired test date. The nonrefundable test fee is \$35.

Two caveats are offered: (1) the OEA will not forward scores to institutions besides the UW, and (2) students who expect to participate in intercollegiate athletics may *not* use locally-scored tests to qualify for NCAA eligibility. If one of these situations applies, an applicant must take the SAT or ACT on a national testing date.



UNDERGRADUATE STUDY

"How Many Credits Do I Need to Transfer to the UW?"

Transfer students often want to know if they must complete a minimum number of credits before transferring. As the chart below demonstrates, they can transfer with any number of credits, but the basis for the admission decision will vary with the number of transfer credits completed.

If an applicant has, by the application closing date, submitted transcripts showing the completion of:	Then an admission decision will be based on:
0-14 transferable ¹ quarter credits	the applicant's high school record. High school GPA + test scores must meet minimum Admission Index for freshmen. Student must achieve minimum cumulative GPA of 2.00 for transferable college course work, but college GPA is not otherwise considered.
15-39 transferable ¹ quarter credits	the applicant's high school and college record. High school GPA + test scores must meet minimum Admission Index for freshmen and college GPA + test scores must meet minimum Admission Index for transfers.
40-74 transferable ¹ quarter credits (30 credits must be graded ²)	the applicant's college record. College GPA + test scores must meet minimum Admission Index for transfers. High school GPA not considered.
75 or more transferable ¹ quarter credits (60 credits must be completed and graded ²)	the applicant's college record. College GPA + test scores must meet minimum Admission Index for transfers. High school GPA not considered. Although test scores are required to complete the application file, an admission decision is sometimes possible without scores for applicants in this category with high GPAs. As a rough guideline, applicants with a cumulative GPA below 3.00 should definitely expect to be required to submit test scores while applicants with a GPA of 3.65 or higher have often not needed to submit scores. However, because the Admission Index (and therefore the minimum college GPA) varies from quarter to quarter, all applicants are urged to submit scores to ensure that their application will be considered.
academic associate degree from a Washington community college	terms of the Direct Transfer Agreement with Washington Community Colleges for residents of the State.

¹ Transferable quarter credits: credits earned for college-level academic courses completed at regionally accredited colleges and universities. Quarter credits are those earned at institutions on a quarter system; one semester credit = 1.5 quarter credits. Transferable college credit includes credits attempted but not satisfactorily completed, i.e., those for which a grade of "F" (0.0) was earned. Beginning summer quarter 1996, the UW will transfer up to 15 credits earned in vocational-technical/occupational programs only if they are included as part of a Washington community college academic associate degree. These credits will not be used in the calculation of the transfer GPA.

² Graded credit: Credit taken for a grade (not pass/fail or satisfactory/not satisfactory) in college-level academic courses at regionally accredited institutions. Credits earned in vocational-technical programs do not count as graded credit.



The Transfer GPA

What follows are general guidelines for understanding how the Admissions Office arrives at the transfer admission GPA, which is used in computing both the Admission Index and the cumulative GPA for Direct Transfer applicants. It must be emphasized, however, that these guidelines cannot address the differences in grading practices that the Admissions staff encounters when reviewing transcripts. In addition, it should be remembered that these policies pertain only to the transfer GPA for purposes of determining general admission to the University. Some undergraduate programs at the University, such as business administration or engineering, have selective admission policies. When transcripts are reviewed for entrance to their program, they may calculate the GPA differently; for example, some departments use only courses in the major field or the GPA earned in the last 45 credits.

In calculating the transfer admission GPA, the Office of Admissions uses:

- All transferable academic courses, from all colleges the student has attended, in which the student has received grades between 0.0 and 4.0 on a 4.0 grading scale. Within this grading scale, Admissions uses the grade assignments of the home institution, whether 3.1 or 3.0 for "B." Although the UW uses a decimal scale for grading students in its own courses, transfer grades are not converted to a uniform decimal scale.
- Repeated courses. Beginning winter 1983, UW policy states that any course may be repeated once and both grades are used in the GPA. Grades earned in subsequent repeats are not considered.
- All transferable academic credit from two-year colleges, even if the student has earned more than 90 transferable credits from two-year colleges. (See Transfer Credit, Notable Restrictions on Transfer Credit.)

The Office of Admissions does not include in the transfer GPA:

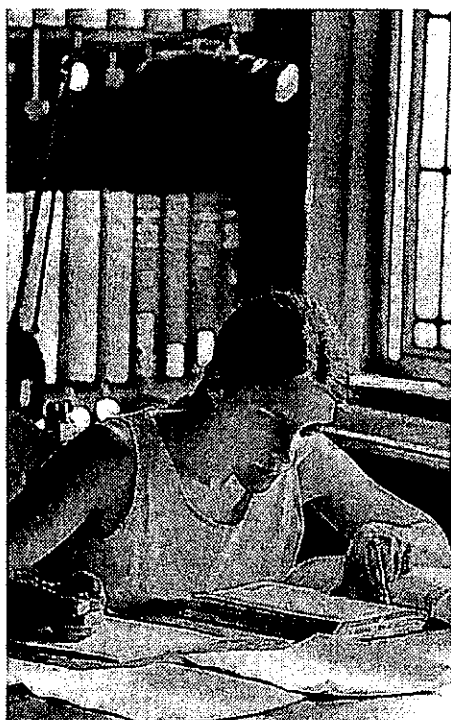
- Courses considered to be below college level
- Math courses equivalent to MATH 101 (intermediate algebra)
- Certain religion courses that teach from a particular doctrinal perspective or that teach preparation for a ministry
- Developmental or remedial courses
- Courses in study skills
- Lower-division military science courses
- English as a Second Language
- Vocational/technical courses
- Courses recorded with a grade of "incomplete" (unless changed to "F" at home institution)
- Courses recorded with a grade of "Pass" or "Satisfactory"
- PE activity credits in excess of 3 quarter credits.

Direct Transfer Agreement with Washington State Community Colleges

The Direct Transfer Agreement is an admission policy for residents of the state attending Washington community colleges.

The Direct Transfer Agreement ensures admission only to premajor status in the College of Arts and Sciences but does not promise admission to any other school or college nor to any particular major or professional field of study within the University. (See below, Transfer Credit, Associate Degree Agreement with Washington Community Colleges.)

If the spaces available for students under this agreement are exhausted for a particular quarter before all eligible Transfer Agreement students have been ad-



- the applicant *matriculates* at another four-year institution or in another UW degree program (e.g., UW-Bothell, UW-Tacoma, UW-Evening Degree Program) after obtaining the associate degree,
- the GPA is below 2.75 at the time the associate degree is completed, or
- the GPA drops below 2.75 for transfer work taken after obtaining the associate degree.

Postbaccalaureate Admission

Postbaccalaureate is a matriculated status reserved for students who are working toward a second bachelor's degree, or preparing for entrance to graduate or professional school. Only a small number of applicants are admitted every quarter as postbaccalaureate (fifth-year) students because the University's primary commitment is to undergraduates who are completing their first bachelor's degree. A student who is inadmissible as a postbaccalaureate may still take advantage of many educational opportunities at the UW by enrolling as a *nonmatriculated* student through University Extension (see the section of the catalog entitled UW Extension).

Admissions Policy

All postbaccalaureate applicants must submit a supplemental statement (discussed below) at the time of application to the University. A small number of applicants may be admitted in summer/autumn and autumn quarters on the basis of GPA alone, but the supplemental statement is required regardless of GPA. *An application submitted without the statement will be considered incomplete and will not be reviewed.*

Admission by GPA

When a minimum GPA is established for routine admissions, it will be in the range of 3.40 to 3.80. In calculating the cumulative undergraduate GPA, the Office of Admissions uses all grades earned at accredited four-year colleges and universities prior to the completion of the first bachelor's degree. Grades from community college course work are not included.

If a postbaccalaureate applicant applies for a department that uses selective admission criteria and is denied admission to the program, the applicant will also be denied admission to the University.

Admission in Winter and Spring Quarters

Because admission to the University may be more strictly limited in winter and spring quarters than in summer/autumn and autumn quarters, there is no guarantee that any postbaccalaureate applicants will be admitted on the basis of GPA alone for winter or spring.

Supplemental Statements

Supplemental statements are reviewed by the Postbaccalaureate Review Committee (PRC). Decisions are made on a rolling basis: the earlier an applicant's supplemental file is complete, the earlier the file will be reviewed. Supplemental statements should be typed or written on stationery or plain paper; there is no special form. The applicant will be notified in writing of the final decision after evaluation of transcripts and the supplemental statement. A complete discussion of the supplemental statement is included in the *Postbaccalaureate Admission Packet* available from the Office of Admissions.

Special Categories of Admission

Special Admissions and the Appeal of Admission Decisions

The University's admission policies must comply with Washington State regulations and faculty-authorized requirements. It is the responsibility of the Office of Admissions to apply these standards consistently and fairly. The faculty recognizes, however, that exceptions should be granted, when appropriate, for students in unusual situations. Applicants who do not meet the University's requirements for admission may write a petition requesting special admission consideration. Such requests for special consideration are reviewed by the Committee on Admissions and Academic Standards. Applicants do not need to be denied before they petition. Applicants planning to submit petitions should request from the Office of Admissions *Undergraduate Admissions Pamphlet #2*, which provides specific guidelines on the petitioning process.

To request disability accommodation in the application process, contact the Office of Admissions at (206) 543-9686 (Voice) or 1-800-833-6388 (Washington State Relay Service TDD).

Office of Minority Affairs Educational Opportunity Program

The Office of Minority Affairs (OMA) is responsible for fostering diversity at the University by providing outreach and support services to underrepresented ethnic minority and economically disadvantaged students within the undergraduate program. Admission to the EOP is limited to applicants who are U.S. citizens or permanent residents, with priority given to Washington state residents.

Students admitted into the EOP are provided special services such as counseling, placement testing, academic tutoring, and special instruction. For more information, contact the Office of Minority Affairs (206) 543-5715.

Nonresident Applicants

As a state-supported university, the UW gives priority to residents and expects nonresident applicants to meet admission standards significantly higher than those required for residents. Under Washington State residency laws, students are defined as either financially independent of parents or as financially dependent on parents.

For financially dependent students to be classified as residents, one or both parents or legal guardians must claim the student as a dependent, and one must be a resident of the state for at least one year before the quarter for which the student is intending to enroll.

Students who are financially independent must establish a permanent residence in Washington for at least twelve consecutive months before the quarter of application, establish all ties with Washington upon moving here (obtain Washington driver's license, voter registration, and other means), be financially independent of parents for the current and previous calendar years, and cannot be claimed as a dependent on federal income tax returns.

Applicants whose residency status is unclear will be asked to submit documentation. Questions about residency status should be directed to the Registrar's Office, Graduation and Academic Records, at (206) 543-4188.

International Students

The University believes its greatest contribution to international education can be made in the area of graduate study.

mitted, remaining applicants may choose to be placed on a priority list for admission to the earliest subsequent quarter for which sufficient spaces are available.

To qualify for admission under the Direct Transfer Agreement, an applicant must:

- be a resident of Washington State,
- transfer directly from a Washington community college,
- complete all core subject requirements by the time of matriculation at the UW (i.e., the point at which the student enrolls for the purpose of earning a degree),
- complete an approved academic associate degree at a Washington community college prior to matriculating at the UW, and
- have a cumulative 2.75 GPA in all transferable academic course work at the time the associate degree was completed and/or at the time of admission. The GPA includes course work completed at all colleges attended. Admission test scores are not required or used.

If the associate degree is projected to be completed prior to matriculation at the UW, no more than one quarter of course work may be outstanding. For example, an applicant for autumn quarter 1997 who expects to complete the associate degree in spring 1997 must submit transcripts through winter 1997. If the applicant in January 1997 submits an application and an initial set of transcripts showing grades through autumn 1996, an updated transcript showing winter 1997 grades will have to be sent to Admissions in March or early April. Nonetheless, early application is encouraged.

If an applicant continues to enroll at a community college or enrolls at a four-year college or university as a *nonmatriculated* student after the associate degree is completed, the Direct Transfer Agreement requires that the student's GPA in transferable course work does not drop below 2.75.

An applicant will not qualify for admission under the Direct Transfer Agreement if:

- the applicant fails to complete the associate degree before matriculation at the University,

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Because of limited University facilities and departmental restrictions, only a small number of international undergraduate applicants are accepted each year. International undergraduate applicants are considered for admission only for summer/autumn quarter or autumn quarter and must present academic records well above the average to be competitive for admission.

To be considered for admission, international students:

- must complete the same high school core subject requirements as other students, as described on pages 23-24 above.
- must attain a minimum score of 540 on the Test of English as a Foreign Language (TOEFL) or 85 on the MLT.
- must submit all documents by the posted deadline (see chart on page 29).

International students seeking matriculated (degree-seeking) undergraduate admission should request an International Undergraduate Preliminary Application from the Office of Admissions. It should be completed and returned by November 1. There is no application fee for submitting the Preliminary Application. Students meeting minimum requirements will be sent an Undergraduate International Admission Application which must be completed by February 1.

Specific information on admission of international undergraduates accompanies the special application form for international applicants.

Non-native Speakers of English

In addition to the English core subject requirement, immigrants and international students who are non-native speakers of English must present evidence of English language proficiency by providing scores from the Test of English as a Foreign Language (TOEFL). The only exceptions are native-born citizens of Australia, Canada, United Kingdom, Ireland, and New Zealand.

Applicants from non-English-speaking countries may demonstrate their English proficiency also by examination. Any one of the following scores will meet this requirement:

Test of English as a Foreign Language (TOEFL)	580
UW-administered MLT	90
SAT I Verbal (taken April 1995 or later)	490
SAT I Verbal (taken before April 1995)	410
ACT English	20

Admitted applicants who do not score high enough on one of these tests will be required to take remedial courses in English as a Second Language (ESL) when they first enroll at the University. An additional fee is charged for each ESL course a student is required to take. Specific information on this requirement may be obtained from the Office of Admissions or, for admitted students, from the Office of Special Services.

More information on the TOEFL appears under English As A Second Language (ESL) Department in the UW Extension section of this catalog.

Returning Former Students

A returning undergraduate or professional student who has not been enrolled for a quarter or more and who did not complete the preceding quarter, or a graduate student returning from Official On-Leave status is required to complete and file a Returning Student Reenrollment Application by the application deadline. A student is eligible to apply as a returning former student only when returning in the same classification

as when previously enrolled. Students applying for a new category (e.g., postbaccalaureate, professional, or graduate) must complete the appropriate application for that category. A returning undergraduate or professional student is required to pay a \$35 application fee by the closing date. Returning former students who have been away from the University less than two quarters have the highest priority for readmission. A student previously enrolled in an academic program with restricted enrollment and/or special admission requirements should consult his or her adviser about procedures for readmission. Returning nonmatriculated students are enrolled only for summer quarter.

The closing dates for returning former student applications are: autumn, July 1; winter, November 1; spring, February 1; summer, June 1.

A returning student must pay a nonrefundable enrollment confirmation deposit of \$100 by the date indicated in the offer of readmission.

The Procedures and Fees section of this catalog contains additional information about registration, tuition, and fees.

Nonmatriculated Students

Many students find their educational needs met through nonmatriculated (non-degree) enrollment. Matriculated status is reserved for students who have met competitive admission standards and who are enrolled primarily for the purpose of earning a degree. For more information about nonmatriculated enrollment, consult the UW Extension section of this catalog.

Auditors

Individuals who wish only to audit University courses should apply for admission with nonmatriculated standing. (See UW Extension section of this catalog.) Attendance in courses as an auditor is by consent of the instructor involved and is conditioned by the extent to which space is available. Permission to audit is ordinarily granted for lecture classes only. An auditor may not participate in class discussion or laboratory work, and his or her registration may be canceled at the discretion of the instructor. No record of audited courses is kept. Regular tuition and fees are charged. To receive credit for an audited course, the student must register for the class for credit in a subsequent quarter.

Filing an Application

Prospective students may obtain the University of Washington undergraduate application form from the Office of Admissions by calling the application request line at (206) 543-5150 or by writing to the Office of Admissions. Departmental applications for programs with special admission requirements (see page 29, Admission to the Major) must be obtained directly from the department.

The University accepts applications transmitted electronically, either through the College Board's ExPAN program or through CollegeLink. Contact your high school counselor for more information. An electronic application on the World Wide Web is under development as this catalog goes to press. Visit the University's home page at <http://www.washington.edu>.

Applicants in all categories are advised to apply early since limited availability of space may necessitate closure of admission prior to the closing dates. In addition, many departments have earlier closing dates. High school and international applicants are encouraged to apply in November for summer or autumn quarters. Transfer and postbaccalaureate applicants should plan to submit required documents at least six weeks before the published closing date or departmental

deadline; applicants for autumn quarter often begin applying in January/February (see Application Closing Dates table on the next page).

A complete application file consists of the following materials:

- **Application**
- **Application fee of \$35 (U.S. funds).** This fee is nonrefundable and must be submitted with each application.
- **Official high school transcript (Freshmen and transfer applicants only including international students).** This record is required of all freshman and transfer applications for the purpose of verifying completion of core subject requirements. For applicants with 40 or more graded transferable quarter credits, high school performance (GPA) will not be considered in determining admissibility.

Applicants are responsible for contacting any high school(s) they have attended and requesting appropriate documents. The Office of Admissions will keep for one calendar year any transcripts or other credentials it receives.

For freshman applicants, a high school transcript must show grades at least through the junior year (grades 9-11).

For transfer applicants, a high school transcript must be a final transcript, showing all courses completed, beginning with grade 9 and through the highest grade completed, regardless of whether the student graduated. Preferably, mathematics and foreign language courses completed in the 8th grade will also be recorded on the high school transcript, but this is not required.

A transcript is official if it bears the official seal and authorizing signature of the issuing institution and is:

- sent directly by the school to the Office of Admissions or
- sealed by the school and mailed or delivered to Admissions by the applicant. If the envelope is opened, the transcript is no longer official.
- **Official test scores from SAT I or ACT (Freshman and transfer applicants only):** Scores from WPCT are acceptable if the applicant took the exam by June 1, 1989.

Test scores are official if they are:

- sent directly from the testing agency to the UW or
- sent directly from the high school (handwritten scores are not acceptable).

Test scores sent directly from the testing agency will enable the Office of Admissions to process an application more quickly.

- **Two official transcripts from each regionally accredited college attended.**

Applicants may not exclude or omit any colleges, regardless of how many credits they earned there or the nature of the program in which they were enrolled.

An application file that is incomplete on the application closing date is not considered further unless space availability permits an extension of the deadline. The application fee will not be returned or applied to a future application. To be considered for a future quarter, it is necessary to submit a new application, an application fee and current documents. Any documents that were submitted in support of an application are retained for twelve months and are transferred to a new application if they are the most current records available.

An application is good only for the specific quarter requested.

Application Closing Dates

Quarter	Freshmen	Transfers and Post- baccalaureates	International Students ³	
			Preliminary Application	International Application
Autumn	February 1	April 15	November 1	February 1
Winter	October 15	October 15	Applications not accepted	
Spring	January 15	January 15	Applications not accepted	
Summer/Autumn ¹	February 1	April 15	November 1	February 1
Summer Only ²	June 1 is the closing date for mail-in application and registration. In-person registration required after June 1.			

¹Begin summer, continue into autumn as a matriculated (degree-seeking) student. Failure to enter summer cancels autumn admission and any registration.

²Nonmatriculated status only; cannot continue into autumn.

³Use *International Undergraduate Preliminary Application*.

Applicants may not delay or defer enrollment. Applicants will have to reapply and pay another application fee if (1) the applicant is accepted but would like to enroll for a later quarter, (2) applicant was not accepted and wishes to apply for a future quarter, or (3) applicant submitted an application and application fee but does not complete application file.

Other Application Forms

Financial Aid

Application for financial aid is a process entirely separate from application for admission. Interested students should contact the University's Office of Student Financial Aid, 105 Schmitz Hall; telephone: (206) 543-6101, or the counselors at their own school for information about financial aid availability. International students are not eligible for financial aid.

University Housing

Admission to the University does not automatically reserve residence hall space. Additional information on student housing appears in The University section of this catalog.

Admission to the Major

Transfer applicants are strongly urged to begin academic planning early in their college career and to contact directly the program(s) they are interested in well before applying for admission to the University. All of the majors available at the UW are listed on page 21, organized by school/college. Majors marked with a ‡ symbol have admission requirements beyond those required for admission to the University.

There are three types of departmental admission policies at the UW:

- **Open.** These majors are open to applicants at the time of admission to the UW or any time thereafter. Examples: oceanography, philosophy.
- **Minimum Requirements.** These majors have minimal admission requirements, such as completing 10 credits of introductory courses with a cumulative GPA of 2.50. Majors in this category generally admit all applicants who meet the minimum requirements, without any further screening or selection. However, some of these majors may make exceptions, depending on the number of applicants they receive for a given quarter. Many of the majors with minimum requirements also require that new students enroll at the UW before applying to their program. Examples: English, history, political science.
- **Competitive.** These majors have competitive admission standards, which fluctuate from quarter to quarter depending on the number of applicants. Fulfilling Uni-

versity admission requirements does not guarantee admission to a specific department or program. The degree of competitiveness varies greatly from major to major. In addition, some of these majors require that new students enroll at the UW before applying to their program. An applicant who declares one of these majors on the admission application but is not admissible to it may be required to enter the UW as a premajor to complete the college courses required for admission to the major of choice. Examples: business, communications, engineering, nursing.

Applicants to majors marked with a ‡ symbol on page 21 should file a University application and submit all other necessary materials at least six weeks before the departmental deadline, to allow time for the department to request any supplementary information from the applicant. In most cases, applicants must also file a separate application with the department. Complete information on departmental admission requirements and procedures may be obtained from the appropriate department.

Academic Credit

Credit

The basic rule for determining academic credit is: 1 credit represents a total student time commitment of 3 hours each week in a 10-week quarter, or a total of 30 hours in a quarter. Total time includes time spent in class, if any; time devoted to individual conference with instructors; time devoted to reading or other study, problem solving, writing, laboratory work, exercises, or any other activity required of the student. A specified number of credits must be earned for a degree.

There are three basic types of credit:

Residence credit is academic credit earned in courses offered by the UW through the quarterly *Time Schedule* and other approved courses offered by UW Extension. To gain residence credit, students must register for such courses during the official registration period.

Extension credit or credit earned through examination is credit earned by completing courses offered as extension courses or credit earned through special examinations. Such courses are not included in the UW grade-point average.

No more than 90 UW extension credits may be counted toward the baccalaureate degree. No more than 45 credits earned in extension courses at other institutions may be counted toward the baccalaureate degree. Ordinarily, extension and independent (correspondence) study credits may not be applied toward the final year.

Transfer credit is credit earned at another institution that is accepted by the University as being applicable toward satisfaction of degree requirements.

Quarter Credit Versus Semester Credit

Colleges and universities that operate on a semester basis (i.e., divide the academic year into two parts, exclusive of a summer session) award semester credit. Quarter credits multiplied by two-thirds equal semester credits. Semester credits multiplied by one and one-half equal quarter credits. For example, a student attending the University who earns 45 quarter credits during an academic year would have earned 30 semester credits at an institution operating on the semester plan.

Credit for Courses Completed in Unaccredited Institutions

Course work completed at unaccredited institutions may be validated or certified through examination described under Earning Credit by Special Examination below.

Transfer Credit

The Office of Admissions awards transfer credit using the guidelines listed below. *It reserves the right to accept or reject credits earned at other institutions of higher education.* In general, it is University policy to accept credits earned at institutions fully accredited by their regional accrediting association, provided that such credits have been earned in university-level courses (see some exceptions below) appropriate to the student's degree program at the University. UW course equivalencies are assigned based on transfer course content when taken, subject to university transfer policies in effect at the time of admission to the UW.

Transfer Credit Evaluation

After the student confirms enrollment—usually by paying a \$100 enrollment confirmation deposit—and shortly before the student's orientation or registration date, the Office of Admissions completes a course-by-course evaluation of transfer credit. (The enrollment confirmation deposit is deducted from the first quarter's tuition but is not refundable if the student does not enroll; students admitted for summer/autumn quarter are not required to pay an enrollment confirmation deposit and, therefore, automatically receive the evaluation in the mail.) One copy of the evaluation is sent to the student; a second copy is sent to the student's academic advising office.

The information recorded on the transfer credit evaluation—including the transfer GPA—becomes a part of the student's permanent record at the University. If a student applies to an academic program with special admission requirements, transfer course work and the transfer GPA will be considered. The official UW transcript—which the student may request sent to other institutions—will not include the transfer GPA or a detailed listing of the transfer credit the UW awarded; it merely lists other colleges the student has attended and the total number of transfer credits awarded. After the student enrolls at the UW, transfer grades are not included in the University GPA.

Postbaccalaureate students are not routinely awarded transfer credit; they received no transfer credit evalua-

UNDERGRADUATE STUDY

tion from the Admissions Office. Students working toward a second baccalaureate degree should consult with their academic adviser to learn how credit from other universities may apply toward their UW degree.

Notable Restrictions on Credit

College-Level Examination Program (CLEP) Credit

The University does not accept or award credit for CLEP general or subject examinations. Any such credit awarded by other institutions, or through independent testing, will not be transferred to the University.

Community College Credit

A maximum of 90 credits from community college course work may be applied toward the credits required for the bachelor's degree. All of the courses transferred from two-year colleges may be used toward graduation requirements, but a student must still complete at least 90 credits of course work at a baccalaureate granting institution (see senior residency requirement, below). Think of transfer courses as a "bank" from which to draw. All of a student's transferable courses remain in the bank to be applied toward specific degree requirements, but 90 additional credits must be earned.

Courses with Overlapping Content

If a department considers two of its courses to have overlapping content, credit will be awarded for only one. For example, credit is granted for either PHYS 114 or PHYS 121. Other departments in which such overlapping courses occur include Astronomy, Computer Science, Economics, Genetics, Geological Sciences, Linguistics, Psychology, and Statistics. Restrictions of this kind are noted in this catalog, generally as part of the course description.

Extension Credit from Other Schools

Extension credit earned at other schools may not exceed 45 credits. AP credit and Military credit, discussed below, is included in the 45 extension credit limit.

Language of Admission

Students who completed two or more years of a high school foreign language receive no college credit for an entry-level course (e.g., FREN 101) in the same language when that course is completed after matriculation at the University. Transfer students who complete such a course before matriculation are eligible to receive transfer credit.

Limitation on ROTC Credits

Credit earned in first- and second-year military training courses may not be counted in the basic 180 credits that are required for graduation. Some third- and fourth-year courses may count, depending on the student's college or school.

Military Credit

Credit earned in Armed Forces Training Schools (AFTS) and through USAFI and DANTES may not exceed 30 credits and are included in the 45 extension credit limit. Official transcripts or DD-214 or DD-295 forms must be submitted, and credit will not be awarded until after the student has enrolled. Scores received in such course work are not included in the transfer GPA.

Native Language

First-year (elementary) or second-year (intermediate) foreign-language credit is not granted either by examination or by course completion in a student's native language. "Native language" is defined as the lan-

guage spoken in the student's home during the first six years of his or her life and in which he or she received instruction through the seventh grade.

Out-of-Sequence Courses

Credit is not awarded for prerequisite courses taken after a more advanced-level course has been completed. For example, students will not be awarded credit for SPAN 102 if taken after SPAN 103.

Physical Education

No more than 3 quarter credits will be allowed for physical education activity courses.

Vocational-Technical Courses

Transfer credit will not generally be awarded for vocational or technical courses. However, a maximum of 15 quarter credits will be awarded in transfer for college-level vocational-technical courses when they have been allowed as electives within the 90 credits comprising an academic associate degree from a Washington community college. Courses in this category are those which would ordinarily provide specialized training for an occupation (e.g., allied health, bookkeeping, electronics, physical therapy assistant). When allowed, these credits will apply only toward the elective credit component of a baccalaureate degree.

Courses Receiving No Credit

The University reserves the right to deny credit for courses which are not compatible with those offered in its baccalaureate degree programs. Some general categories of courses never receive transfer credit. Examples include:

- courses below college level (usually numbered below 100)
- repeated courses or courses with duplicate subject content
- course work earned at an institution that did not hold at least candidacy status with its regional accrediting association when the course work was taken
- courses that provide instruction in a particular religious doctrine
- mathematics courses considered below college level, including basic math, business math, and beginning and intermediate algebra
- courses offered for non-credit continuing education units
- remedial English (e.g., reading, vocabulary development, grammar, speed reading or any courses that are preparatory to an institution's first Freshman Composition course)
- remedial courses in any academic discipline (100-level and above)
- lower division military science courses*
- non-academic/vocational-technical courses*

* Credit may be awarded for these courses if included within the 15 credits allowed for vocational-technical courses completed as part of an academic associate degree as described in the preceding section.

Appeal Procedure

If not all courses transfer as the student had anticipated, and the academic adviser cannot explain the discrepancy, the student should consult an admission specialist in the Office of Admissions. Further appeal can be directed to the UW Transfer Officer in the Admissions Office.

Class Standing

A student's class standing is determined by the total number of transfer credits awarded by the UW, not by the number of years of college study or completion of an associate degree.

The following table lists the required credits for each class:

Freshman	0-44
Sophomore	45-89
Junior	90-134
Senior	135 or more

Satisfying UW graduation requirements depends not only on the number of credits completed (a minimum of 180) but also on completion of all college and major requirements.

Applicability of Transfer Credit to Degree Requirements

Before a student first registers for classes at the University, he/she will meet with an academic adviser to plan a program of study. The adviser will determine how transfer credits shown on the evaluation may be applied to UW degree requirements. Although Admissions may award a student 100 transfer credits, for example, only 70 of those credits might apply toward the various graduation requirements for a student's degree program.

The Associate Degree Agreement with Washington Community Colleges

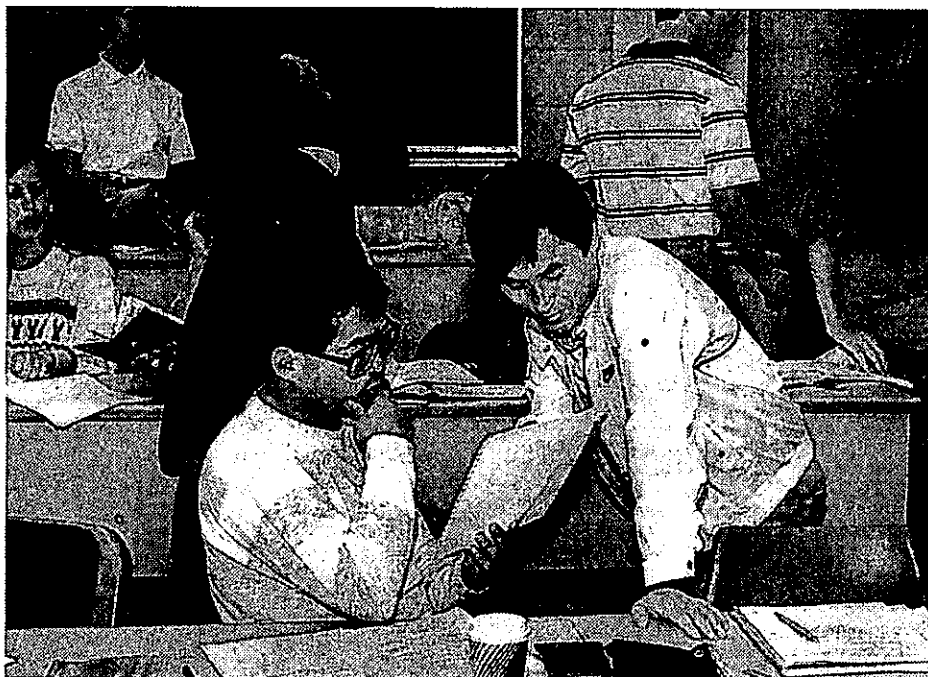
Many community college students who plan to transfer to the University ask about the advantage of earning an associate degree before they transfer. There are two separate agreements that may benefit such students. Both agreements apply only to students with academic-transfer (as opposed to vocational/technical) associate degrees, and only to those whose degrees are from community colleges in Washington.

One of these, the **Direct Transfer Agreement**, assures students of priority consideration for admission to the UW. (See above for a complete discussion). Admission under the Direct Transfer Agreement does not guarantee admission to any specific program within the University.

The other agreement, called the **Associate Degree Agreement**, affects how courses from the community college apply toward graduation requirements from some colleges/schools at UW. To qualify for the agreement, a student must complete all the requirements for the associate degree before regular admission to UW; earlier enrollment as a nonmatriculated student in summer quarter, UW Extension, or UW correspondence courses, however, is allowed. Unlike the Direct Transfer Agreement, the Associate Degree Agreement may also apply to students who have matriculated at another four-year institution between earning the associate degree and transferring to the UW.

Benefits of the Associate Degree

The primary benefit is that students may count transfer courses toward Areas of Knowledge (formerly distribution) requirements if the community college counted them, even if the courses are not listed as counting for Areas of Knowledge in the UW Transfer Guide. Humanities courses will count for Visual, Literary, & Performing Arts; Social Science courses for Individuals & Societies; and Natural Science courses for the Natural World. (Note: Completing the Areas of Knowledge requirement does not automatically mean that an applicant has fulfilled the high school core subject requirements. See pages 23-24 for the discussion of admission core subject requirements.) There are three possible pitfalls, however:



- no more than 15 credits in the student's major department may be counted for Areas of Knowledge;

- some courses will not be counted for both Areas of Knowledge and proficiency (e.g., for a student in the College of Arts and Sciences who has only one foreign language, the first year of that foreign language would not count for Visual, Literary, & Performing Arts, because it must be used for the foreign-language proficiency requirement instead); and

- a course that does not transfer for credit (e.g., intermediate algebra) does not count toward graduation requirements.

Many students with associate degrees have earned fewer than the required credits in each of the three Areas of Knowledge (the Natural World, Individuals & Societies, and the Visual, Literary, & Performing Arts), and thus will be completing the requirements at the UW. Students are *not* exempted from other specific general education requirements of their UW school/college.

1994 Requirements

The schools and colleges of the University implemented new general education requirements, effective autumn of 1994.

Bachelor Degree Planning

Students often assume that work on a major does not begin until the junior year. It is important to investigate the requirements of any intended major. Some community colleges have associate-degree options that allow students to earn the A.A. while fulfilling the requirements of specific UW majors. Lacking those options (and depending on the likelihood of being admitted without recourse to the Direct Transfer Agreement), students may sometimes be better off not earning the associate degree, particularly for programs outside the College of Arts and Sciences, such as engineering or business, that have very specific prerequisites. In some cases, it may even be better to transfer with fewer than 90 credits. For example, students planning to major in certain languages may need to start earlier

than their junior year if course work is available only at the UW. Students in some preprofessional programs such as premedicine or predentistry will probably not need to transfer early, but they should talk with an adviser at the UW late in their freshman year.

Transferring from Washington Community Colleges

The UW subscribes to the statewide Policy on Inter-College Transfer and Articulation Among Washington Public Colleges and Universities endorsed by the public colleges and universities of Washington and the State Board for Community and Technical College Education, and adopted by the Higher Education Coordinating Board. The policy deals with the rights and responsibilities of students and the review and appeal process in transfer credit disputes.

Earning Credit by Special Examination

With departmental approval, regularly admitted and currently enrolled students may "challenge a course," by special examination to gain credit without being enrolled in specific courses.

1. For independent study.
2. For work completed with private teachers.
3. For work completed in unaccredited institutions if a formal examination is deemed necessary by the Chair of the concerned department(s). (In some cases, credit may be validated without an examination. Students who wish to validate credit should inquire at the Office of Admissions.)

The following restrictions apply:

- a. No one may take a credit examination for a course in which he or she has previously registered.
- b. All credits earned by examination are counted as extension credit and if earned at the UW, are included

in the 90-extension-credit maximum that may be applied toward the baccalaureate degree. (Transfer extension credit is limited to 45 quarter credits.) No credit is allowed by examination if the grade earned is less than 2.0. Grades earned are not included in the GPA.

- c. No student shall receive credit by examination for a course for which the student would not be eligible to receive credit if the course were taken in residence, i.e., SPAN 202 if credit already awarded for SPAN 203.

- d. No student is permitted to repeat any examination for credit.

- e. No student shall receive credit by examination for lower-division courses in the student's native language. (Some language departments have more restrictive policies. Consult the individual language department for details.)

- f. Credit by examination is not acceptable for application toward an advanced degree in the Graduate School.

A student who wishes to qualify for credit by examination must apply to the Graduation and Academic Records Office for a certificate of eligibility no later than Friday of the second week of the quarter. The student presents the form to the instructor and Chair and/or Dean for signed approval. It is then returned to the Graduation and Academic Records Office. Signed forms and payment of \$25 for each course to be challenged must be submitted by Friday of the second week of the quarter.

Examinations are administered by the Office of Educational Assessment during the fifth week of the quarter.

No student is permitted to take more than two examinations in 3-, 4-, or 5-credit courses, or more than three examinations in 1- or 2-credit courses in one day. If the student plans to take more examinations in a given quarter, an additional day may be permitted and arrangements made with the Office of Educational Assessment.

Credit for Beginning College Study at an Advanced Level

A student who begins college study in the third quarter of the second-year University language sequence may receive 5 credits for the second quarter of the second-year course, provided the third-quarter course is successfully completed. Similarly, a student who begins college study with an upper-division course in a language (other than courses in English translation or in conversational practice) may be granted 10 credits for the second- and third-quarter courses of the second-year sequence, provided that course is successfully completed.

A student who is placed by examination at the level of MATH 125 or higher receives additional credits upon completion of the advanced course. If the student's first University mathematics course is MATH 125, credit for MATH 124 is given. A student whose first mathematics course is MATH 126 is given credit for both MATH 124 and 125.

A student who is placed by examination at the level of CSE 143, may upon successfully completing the course, receive credit for CSE/ENGR 142.

A student must apply for advanced standing credits at the Graduation and Academic Records Office after having completed the advanced course.

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Advanced Placement Program (College Board)

Students who complete college-level work in high school may receive credit or placement, or both, at the University on the basis of performance on an Advanced Placement examination.

Listed below are departmental policies on granting placement or credit for AP examinations. Scores range from a high of 5 to a low of 1; in most departments, credit and/or placement is awarded for scores of 3 or higher. In some cases, the student must consult the appropriate departmental adviser after arriving at the University.

Art

Art History AP-5 ART H X (10 credits). See departmental adviser for placement. Credits may apply to Visual, Literary, & Performing Arts requirement.

AP-4 ART H X (5 credits). See departmental adviser for placement. Credits may apply to Visual, Literary, & Performing Arts requirement.

Studio Art No credit. See departmental adviser for placement.

Biology AP-5
AP-4 BIOL 101-102 (10 credits). May be evaluated as credit for two quarters of BIOL 201, 202, 203 sequence. See biology adviser.

Chemistry No credit is given. Engineering students who are exempt should consult engineering departmental advisers.

AP-5 Exemption from CHEM 140, 141, 150, 151, 160, 161 granted upon successful completion of CHEM 237 or 335; consult chemistry adviser.

AP-4 Exemption from CHEM 140, 141, 150, 151 granted upon successful completion of CHEM 160 or 165; consult chemistry adviser.

AP-3 Exemption from CHEM 140, 141 granted upon successful completion of CHEM 150, 151; consult chemistry adviser.

Classics

Latin Lyric AP-5
AP-4 LATIN 305, 306 (10 credits)

AP-3 LATIN 103 (5 credits)

Vergil AP-5
AP-4 LATIN 305, 307 (10 credits)

AP-3 LATIN 103 (5 credits)

Latin Lyric and Vergil AP-5
AP-4 LATIN 305, 306, 307 (15 credits)

AP-3 LATIN 103 (5 credits)

Computer Science

A Exam AP-5 or
AP-4 CSE 142 or ENGR 142 (4 credits)

AB Exam AP-5,
AP-4, or
AP-3 CSE 142 or ENGR 142 (4 credits)

With permission of CSE 143 instructor, students scoring 5 or 4 may also receive credit for CSE 143.

Economics No credit will be given. See departmental adviser for placement.

English AP-5
AP-4
AP-3 ENGL 111 (5 credits) For students with AP-5, 4, or 3 scores on either the language and composition examination or the composition and literature examination.

AP-5
AP-4
AP-3 ENGL 111, 131 (10 credits). For students with AP-5, 4, or 3 scores on both the language and composition examination and the composition and literature examination.

German

Language AP-5 GERMAN 201, 202, 203 (15 credits)

AP-4 GERMAN 201, 202 (10 credits)

AP-3 GERMAN 201 (5 credits)

Literature AP-5 GERMAN X (12 credits)

AP-4 GERMAN X (9 credits)

AP-3 GERMAN X (6 credits)

See departmental adviser for exact courses and placement. Any 3, 4, or 5 score satisfies the College of Arts and Sciences foreign language requirement.

Government and Politics

American No credit will be given.

Comparative No credit will be given.

History

American AP-5
AP-4 HSTAA 201 (5 credits)

European AP-5
AP-4 HIST 113 (5 credits)

Mathematics

AB Examination AP-5 MATH 124, 125 (10 credits)

AP-4
AP-3 MATH 124 (5 credits)

BC Examination AP-5
AP-4 MATH 124, 125 (10 credits)

AP-3 MATH 124 (5 credits)

Music

Appreciation No credit. See departmental adviser for placement.

Theory No credit. See departmental adviser for placement.

Physics AP-5
AP-4 No credit. Exemption from PHYS 121/131, 122/132 for Physics C examination, or from PHYS 114, 115, 116 for Physics B examination. For Engineering, students who are exempt must take additional courses to meet the minimum physics requirement.

Psychology AP-5 or
AP-4 PSYCH 101 (5 credits)

Romance Languages

Language AP-5 FRENCH (SPAN) 201, 202, 203 (15 credits)

AP-4 FRENCH (SPAN) 201, 202 (10 credits)

AP-3 FRENCH (SPAN) 201 (5 credits)

Literature Credit allowed at second-year level.

AP-5 FRENCH (SPAN) X (15 credits)

AP-4 FRENCH (SPAN) X (10 credits)

AP-3 FRENCH (SPAN) X (5 credits)

International Baccalaureate

Students may receive college credit at the University for International Baccalaureate Higher Level subjects. In general, five (5) quarter credits are granted for each Higher Level subject in which a score of 5 or higher is earned.

Language	Language A1 or B
Individuals & Societies	History, Geography, Philosophy, Social Anthropology, Business & Organization
Experimental Sciences	Physical Science, Experimental Psychology, Environmental Systems
Mathematics	Mathematics, Mathematical Methods, Mathematical Studies, Mathematics with Further Mathematics
Electives	Latin, Classical Greek, Computing Studies

For the following exams, different policies pertain:

Art/Design	No credit; see art adviser for placement.
Biology	Credit varies; see biology adviser.
Chemistry	No credit; see chemistry adviser for possible exemption from course work.
Economics	No credit; see economics adviser for placement.
Music	Credit varies; see music adviser.
Physics	No credit; consult physics adviser for possible exemption from course work.

University Placement Tests

Information concerning mathematics, chemistry, and foreign language placement tests is included with the offer of admission or in the leaflet on registration instructions, which is mailed to applicants upon receipt of their enrollment confirmation. Additional information on recommended tests may be obtained from the appropriate college or departmental advising office. Testing information is also available at the Office of Educational Assessment, 453 Schmitz.

B-	2.8-2.6	
C+	2.4-2.2	
C	2.1-1.9	
C-	1.8-1.5	
D+	1.4-1.2	
D	1.1-0.9	
D-	0.8-0.7	Lowest passing grade.
E	0.0	Failure or Unofficial Withdrawal. No credit earned.

Additional information on grades and scholarship rules may be obtained from the Graduation and Academic Records Office, 264 Schmitz.

The following letter grades also may be used:

N No grade. Used only for hyphenated courses (courses not completed in one quarter) and courses numbered 600, 601, 700, 750, and 800.

I Incomplete. An incomplete is given only when the student has been in attendance and has done satisfactory work until within two weeks of the end of the quarter and has furnished proof satisfactory to the instructor that the work cannot be completed because of illness or other circumstances beyond the student's control. To obtain credit for the course, an undergraduate student must convert an incomplete into a passing grade no later than the last day of the next quarter. *The student should never reregister for the course as a means of removing the incomplete.* An incomplete grade not made up by the end of the next quarter is converted to the grade of 0.0 by the Registrar unless the instructor has indicated, when assigning the incomplete grade, that a grade other than 0.0 should be recorded if the incomplete work is not completed. The original incomplete grade is not removed from the permanent record.

An instructor may approve an extension of the incomplete removal deadline by writing to the Graduation and Academic Records Office no later than the last day of the quarter following the quarter in which the incomplete grade was assigned. Extensions, which may be granted for up to three additional quarters, must be received before the incomplete has been converted into a failing grade.

In no case can an Incomplete received by an undergraduate be converted to a passing grade after a lapse of one year.

S Satisfactory grade for courses taken on a satisfactory/not satisfactory basis. An S grade is automatically converted from a numerical grade of 2.0 or above for undergraduates. The grade S may not be assigned directly by the instructor, but is a grade conversion by the Office of the Registrar. Courses so graded can only be used as free electives and cannot be used to satisfy a University, college, or department course requirement. S is not computed in GPA calculations.

NS Not-satisfactory grade for courses taken on a satisfactory/not satisfactory basis. A grade less than 2.0 for undergraduates is converted to NS. NS is not included in GPA calculations. No credit is awarded for courses in which an NS grade is received.

CR Credit awarded in a course offered on a credit/no credit basis only or in courses numbered 600, 601, 700, 750, and 800. The minimum performance level required for a CR grade is determined, and the grade is awarded directly, by the instructor. CR is not computed in GPA calculations.

NC Credit not awarded in a course offered on a credit/no credit basis only or in courses numbered 600, 601, 700, 750, and 800. The grade is awarded directly by the instructor and is not included in GPA calculations.

W Official withdrawal or drop from a course from the third through the seventh week of the quarter for undergraduates. A number designating the week of the quarter is recorded with the W when a course is dropped. It is not computed in GPA calculations.

HW Grade assigned when an undergraduate is allowed a hardship withdrawal from a course after the seventh week of the quarter. It is not computed in GPA calculations.

Nontraditional Grading Options

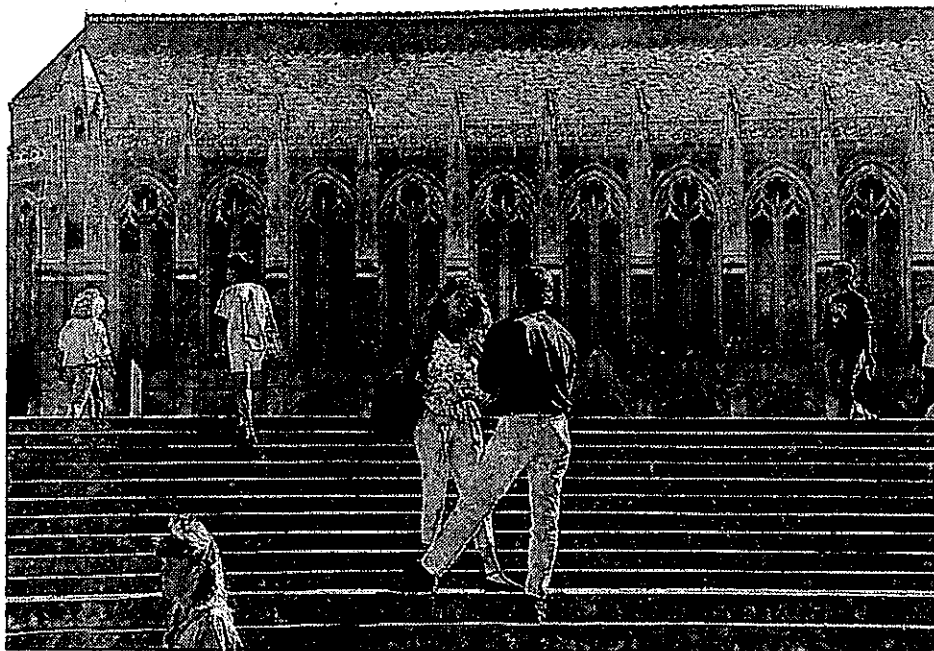
Credit/No Credit-Only as a Course Option

With appropriate departmental review and approval, a course may be offered on a credit/no credit-only basis. The standard for granting credit in credit/no credit-only

Grading System

The UW uses a numerical grading system with certain exceptions in the schools of Dentistry, Law, and Medicine. Instructors may report grades from 4.0 to 0.7 in 0.1 increments and the grade 0.0. The number 0.0 is assigned for failing work or unofficial withdrawal. Grades in the range 0.6 to 0.1 may not be assigned. Grades reported in this range are converted by the Office of the Registrar to 0.0. Numerical grades may be considered equivalent to letter grades as follows:

A	4.0-3.9
A-	3.8-3.5
B+	3.4-3.2
B	3.1-2.9



UNDERGRADUATE STUDY

courses under this option is the demonstration of competence in the material of the course to the instructor's satisfaction.

Satisfactory/Not Satisfactory Grading Option

Certain students are eligible to choose that a limited number of their courses be graded satisfactory/not satisfactory rather than with regular numerical grades. Any student who wishes to register for a course on a satisfactory/not-satisfactory basis should check first with his or her adviser to determine restrictions and eligibility, because colleges and departments vary in their rules concerning this grading option (e.g., students in the College of Arts and Sciences may not take courses S/NS until they have earned 45 or more college credits). In no case is a student allowed to register for more than 6 credits (or for one course, if that course is offered for more than 6 credits) on a satisfactory/not-satisfactory basis in a given quarter. No more than 25 satisfactory/not-satisfactory credits may be applied to a four-year undergraduate degree. Such courses may not be used to satisfy University, college, or departmental course requirements (i.e., may be applied only to the elective component of a degree).

Generally, a student may not switch to or from satisfactory/not-satisfactory grading for a particular course after the second week of the quarter. Only students in good academic standing (i.e., not on academic warning or probation) are eligible for the S/NS grading option. Veterans receiving benefits should check with the Office of Special Services regarding nontraditional grading options.

It should be noted that the possibility of future objective evaluation of the student's total academic record is reduced by the extent to which the record includes course work that is evaluated by a grading system other than the numerical system. A student should be aware that he or she may jeopardize future educational opportunities, particularly for graduate or postbaccalaureate study, when other systems of performance evaluation are used.

Grade-Point Average (GPA)

The University's cumulative GPA is based solely on courses taken in residence at the UW; this includes some, but not all, courses taken through UW Extension. The UW transcript also reflects grades for UW Extension course work that is not residence credit, and the grades for credit by examination. These latter grades do not affect the University cumulative GPA.

Computation of GPA

The GPA for graduation is computed by dividing the total cumulative grade points by the total graded credits attempted for courses taken in residence at the University. Grade points are calculated by multiplying the number of credits by the numeric value of the grade for each course. The sum of the grade points is then divided by the total graded credits attempted. Courses elected on an S/NS basis are counted as follows: Satisfactory grades are printed on the permanent record as an S and do not count in the quarterly or cumulative GPA, but they do count as credits earned toward graduation. Not-satisfactory grades, NS, do not count in the quarterly and cumulative GPA and do not count as credits earned toward graduation.

EXAMPLE 1

Course	Credits	Grade	Grade points
CLAS 205	3	CR	
OCEAN 101	5	2.7	= 13.5
HIST 111	5	4.0	= 20.0
SCAND 100	2	3.3	= 6.6
Total credits earned toward graduation	15		
Total graded credits attempted	12		40.1
GPA = $40.1 \div 12 = 3.34$			

The total graded credits attempted, not the credits earned toward graduation, are used in computing the GPA.

EXAMPLE 2

Course	Credits	Grade	Grade points
ENGL 121	5	2.3	= 11.5
OCEAN 101	5	0.0	= 0.0
SPHSC 100	3	2.7	= 8.1
ART 121	5	I	= 0.0
Total credits earned toward graduation	8		
Total graded credits attempted	13		19.6
GPA = $19.6 \div 13 = 1.51$			

The student attempted 18 credits, but only 13 are graded, because the incomplete (I) is not computed in the GPA. The 0.0 for OCEAN 101 is computed in the GPA, but no credit is awarded toward graduation.

If the work in ART 121 is not made up by the end of the next quarter, the I is converted to a numeric grade and the GPA is recomputed.

Repeating Courses

With the approval of the academic department offering the course, an undergraduate may repeat a course once. Both the original grade and the second grade are computed in the GPA but credit is allowed only once. Veterans receiving benefits must receive approval from the Office of Special Services before a course is repeated.

Grading Procedures

Change of Grade

Except in case of error, no instructor may change a grade that he or she has turned in to the Registrar. A student who finds administrative omissions or errors in a grade report must make application to the Registrar for a review not later than the last day of the student's next quarter in residence, but in no case after a lapse of two years. Grades used to meet graduation requirements cannot be changed after the degree has been granted. Time spent in military service is not counted as part of the two-year limitation. Students are not automatically notified of grade changes posted after the first of the quarter.

Grade Appeal Procedure

A student who believes he or she has been improperly graded first discusses the matter with the instructor. If the student is not satisfied with the instructor's explanation, the student may submit a written appeal to the Chair of the department, or in a nondepartmental college, to the Dean, with a copy of the appeal also sent to the instructor. The Chair, or Dean, consults with the instructor to ensure that the evaluation of the student's performance has not been arbitrary or capricious. Should the Chair believe the instructor's conduct to be

arbitrary or capricious and the instructor declines to revise the grade, the Chair (or the Dean in a nondepartmentalized school or college), with the approval of the voting members of his or her faculty, shall appoint an appropriate member, or members, of the faculty of that department to evaluate the performance of the student and assign a grade. The Dean and Provost should be informed of this action.

Once a student submits a written appeal, this document and all subsequent actions on this appeal are recorded in written form for deposit in a department or college file.

Grade Reports

Grade reports are mailed to all students, except those in the School of Medicine, at the close of each quarter. The grade reports are sent to the mailing address on file with the Registration Office. To ensure delivery of grades, changes in the mailing address should be reported in-person to the Registration Office, 225 Schmitz, or by telephone on the Address Change Telephone Service, 543-3668, by the last day of instruction. Copies of the quarterly grade reports are also sent to each student's Dean and major department.

Scholarship

Low Scholarship

Academic Warning

An undergraduate student whose GPA falls below 2.00 in his or her first quarter at the University receives an academic warning. If a cumulative GPA of at least 2.00 for courses earned in residence at the University is not achieved by the end of the next quarter, he or she is placed on academic probation.

Probation and Dismissal for Low Scholarship

An undergraduate student is placed on academic probation at the end of any quarter (except for the first quarter at the University, when an academic warning is issued) in which his or her cumulative GPA falls below 2.00. The student remains on probation until the cumulative GPA is raised to a 2.00. If this requires more than one quarter's work, the student must maintain a quarterly GPA of at least 2.50 each succeeding quarter or the student is dropped for low scholarship.

Reinstatement

A student who has been dropped under low-scholarship rules is readmitted to the University only at the discretion of the Dean of the school or college to which readmission is sought. A student readmitted after being dropped under these rules reenters on academic probation. The student's GPA is the same as when dropped from the University, and the student may not use grades from other colleges or universities to raise his or her UW GPA. A readmitted student is dropped if he or she fails to attain either a 2.50 GPA for the following quarter's work or a cumulative UW GPA of 2.00 at the end of that quarter. The student is removed from probation at the end of the quarter in which a cumulative GPA of 2.00 or better is reached.

Senior in Final Quarter

A senior who has completed the required number of credits for graduation, but whose work in what would normally be his or her final quarter places him or her on probation, does not receive a degree until removed from probation. A senior who has completed the required number of credits for graduation, but whose work in his or her last quarter results in his or her being dropped for low scholarship, does not receive a degree until readmitted and removed from probation.

Dean's List

Quarterly Dean's List

The quarterly Dean's List includes the names of matriculated undergraduate students who have attained a quarterly GPA of 3.50 in the final grades for at least 12 graded credits. Appropriate entries regarding inclusion on the Dean's List are made on the student's permanent academic record.

Yearly Dean's List

The yearly Dean's List high scholarship award is recorded on the academic transcript of students who have achieved the following:

A quarterly GPA of 3.50 in 12 or more numerically graded credits each quarter for three quarters of the academic year (summer, autumn, winter, spring).

Students enrolled for four quarters of the academic year (summer through spring) must satisfy the conditions outlined above and attain a quarterly GPA of 3.50 or better in the fourth quarter, if enrolled for 10 or more credits.

Students who are on the yearly Dean's List receive a certificate.

Baccalaureate Honors

Baccalaureate honors (*summa cum laude*, *magna cum laude*, *cum laude*) are awarded only to recipients of a first baccalaureate degree. These honors are earned by those students who have completed no fewer than 90 residence credits at this institution. At least 60 of the 90 credits must have been acquired on a graded basis.

The University's Honors Committee determines annually the grade-point requirement for each baccalaureate honor. In recent years, approximately ten percent of the students have been awarded baccalaureate honors. Credits earned by correspondence courses are not counted toward honors eligibility.

Freshman Medal, Sophomore Medal, Junior Medal, President's Medal

The Freshman Medal is awarded to the sophomore having the highest scholastic standing for the first year of his or her course. To be eligible, students must have completed at least 36 graded credits in residence at the University.

The Sophomore Medal is awarded to the junior having the highest scholastic standing for the first two years of his or her course. To be eligible, students must have completed at least 40 credits in residence at the University.

The Junior Medal is awarded to the senior having the highest scholastic standing for the first three years of his or her course. To be eligible, students must have completed at least 40 credits in residence at the University.

The President's Medal, which is conferred at commencement, recognizes the graduating senior who has the most distinguished academic record. Only students who have earned at least 90 credits in residence at the University may be considered.

Honorary Societies

In addition to the honors discussed above, students with distinguished academic records may participate in several University-wide honorary societies, de-



scribed below, and specific college or school honorary societies. Information concerning specific college or school honorary societies appears in the respective sections of this catalog.

Golden Key National Honor Society. A national, non-profit academic honors organization founded in 1977 for the purpose of recognizing and encouraging scholastic achievement among students from all academic fields. Membership is by invitation only.

Mortarboard. A national college senior honor society whose membership is based on scholarship, leadership, and service. The local Tolo chapter was first founded in 1909 and became part of the national organization in 1925. Students of junior standing apply winter quarter for selection in spring quarter.

Phi Beta Kappa. A national collegiate honorary society, founded in 1776, with the Washington Alpha Chapter established in 1914. Phi Beta Kappa recognizes distinguished scholarship, especially in the acquisition of an education in the liberal arts and sciences. Students are elected to membership on the basis of GPA and breadth of education.

Additional information on honorary societies may be obtained from academic advisers and the respective campus representatives.

Graduation

Graduating Senior Priority

Graduating seniors or postbaccalaureate students with a degree application on file in the Graduation and Academic Records Office may register on the first day of Period I for their final two quarters. Students who postpone their graduation may save their priority quarters by not registering before their regular senior or postbaccalaureate priority day. When students have used their Graduating Senior Priority for two quarters, their registration priority reverts to the regular senior or postbaccalaureate schedule. See the quarterly *Time Schedule* for current information.

Filing an Application for Baccalaureate Degree

A student should file a written application for his or her degree with the Graduation and Academic Records Office, 264 Schmitz, two to three quarters before the expected date of graduation. The absolute deadline for filing an application is Friday of the third week of the quarter in which the student intends to graduate.

It is the student's responsibility to apply for a degree and/or certificate, because degrees are not automatically awarded when requirements have been satisfied. Application forms and diploma cards are available at the Graduation and Academic Records Office and in the major departments.

The signature of the department head or of an authorized adviser must appear on the application in the space provided for "Signature of major adviser." If the student's major is in a college other than Arts and Sciences, the signature of the dean or a designated representative is required. The student is also required to sign the application.

After the application is reviewed, the second and third copies are sent to the department or college office and the original is retained in the Graduation and Academic Records Office. If a problem regarding the application arises, the Graduation and Academic Records Office notifies the student. Departmental advisers should notify the Graduation and Academic Records Office of any changes made to the courses and credits listed on the application.

If an applicant is ineligible to graduate because of a deficiency, the Graduation and Academic Records Office notifies the student.

University Requirements for Baccalaureate Degree

To graduate, a student must meet University, college or school, and departmental requirements. Only University requirements are listed in this section. Requirements of colleges, schools, and departments appear in the section pertaining to the college, school, or department concerned.

Scholastic Standards Required

To be eligible for the baccalaureate degree, a student must earn a cumulative GPA of 2.00 for all work done in residence at the University.

The *graduation* GPA is computed when the student has completed all work for the degree and includes only credits earned while in residence at the University.

Credits Required

To be eligible for graduation from the University with the baccalaureate degree, a student must satisfy all other specific requirements and must offer a minimum of 180 academic credits.

University General Education and Proficiency Requirements

The University has adopted minimum general education and proficiency requirements. Individual schools and colleges may establish general education and proficiency requirements in excess of University requirements. Consult the undergraduate program section of each school or college for specific graduation requirements.

Limitation on ROTC Credits

Credits earned in first- and second-year military training courses cannot be counted in the basic 180 credits required for graduation. Some third- and fourth-year courses may count, depending on the student's college or school.

Limitation on Physical Education Activity Credits

No more than 3 physical education activity credits can apply toward a degree.

Final-Year Residence Requirement

To be recommended for a first or subsequent baccalaureate degree, a student must complete the final 45 credits as a matriculated student in residence at the University. The granting of exceptions to this rule is the responsibility of the Dean of the college or school awarding the degree. If an exception is granted, the student still must present a minimum of 45 credits taken in residence as a matriculated student to be awarded a UW degree.

Effective Date for Graduation Requirements

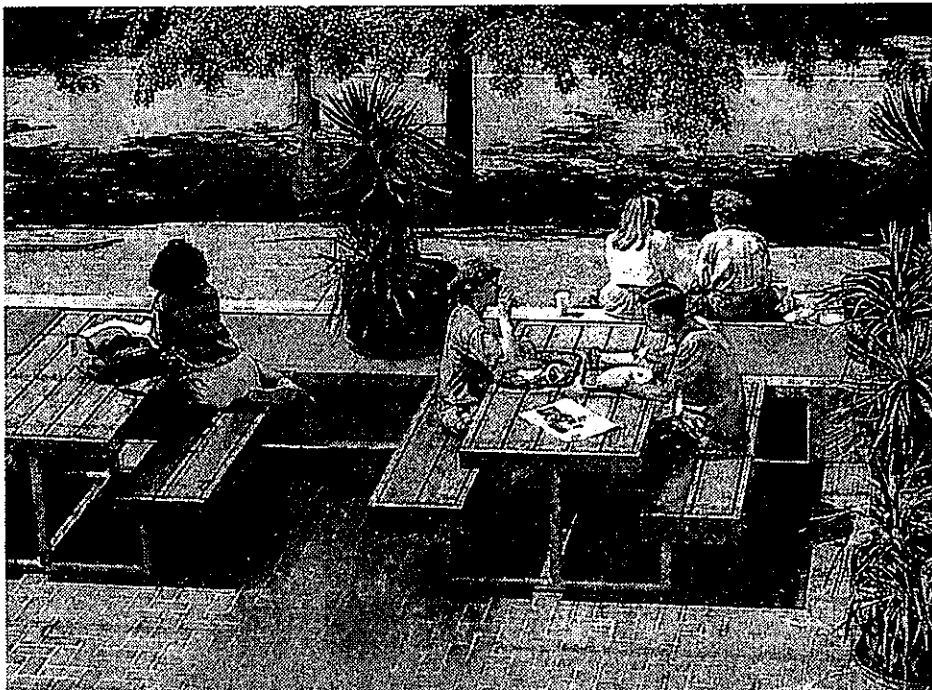
If fewer than ten years have elapsed since a student's admission into her or his major program, she or he may choose to graduate under the major program requirements in effect at the time of admission, or under any subsequent requirements. The choice shall be subject to approval of the student's departmental chair and dean, according to the procedures established in Section 23-48 of the Faculty Code.

If the student wishes to obtain a degree after a lapse of more than ten years from the date of admission to the major program, she or he must meet the requirements in effect at the time of graduation unless permission to use earlier requirements is granted, either as a general policy or expressly for the individual student, by the department, school, or college whose requirements are in question.

These provisions do not apply to the requirements for teaching certificates, which are prescribed by the College of Education at the time the certificate is to be granted.

Waiver of Graduation Requirements

A request for waiver of college or University graduation requirements is petitioned to the college graduation committee, which refers the petition to the Committee



on Admissions and Academic Standards if an all-University requirement is involved. These petition forms are available at the Graduation and Academic Records Office or the advisory office. A student should see his or her academic adviser to initiate a petition. Because the Committee on Admissions and Academic Standards meets only quarterly, petitions involving University requirements should be filed early in the quarter.

An exemption from an all-University graduation requirement that is granted by the Committee on Admissions and Academic Standards becomes void at the end of two calendar years from the date such exemption is granted if all degree requirements have not been completed within that period.

Graduation Requirements for ROTC Students

As a prerequisite for graduation from the University, students accepted for the third- and fourth-year advanced ROTC program must complete the advanced program unless excused or dismissed from this requirement by regulations prescribed by the Secretary of the Army, the Navy, or the Air Force, whoever has the authority in the individual case.

Two Majors or Two Degrees

Second Baccalaureate Degree

A second baccalaureate degree may be granted, but a student must earn a minimum of 45 credits beyond the number required for the first baccalaureate degree. These credits usually must be earned in residence, with the granting of exceptions to the residency rule being the responsibility of the college or school awarding the degree. Students working for a second baccalaureate degree are not registered in the Graduate School. The student must achieve no less than a 2.00 cumulative GPA in the credits required for the second degree.

Degrees with Two Majors

Some colleges allow a baccalaureate degree with two majors. The student's application for such a degree must show both majors and be approved by the advis-

ers of both departments. Both majors appear on the transcript and both must be either Bachelor of Arts or Bachelor of Science degrees.

Two Baccalaureate Degrees Concurrently

Two baccalaureate degrees, associated with different majors, may be granted at the same time, but the total number of academic credits earned must be at least 45 credits in excess of the number required for the first baccalaureate degree.

Academic Minors

Degrees with Minor: departments, schools, and colleges are authorized to provide a course of study leading to an undergraduate academic minor. Requirements are within the purview of the department, school, or college. The minor shall consist of no fewer than 25 credits. Interdisciplinary minors are acceptable. Completion of the minor will appear on the permanent record.

Requirements for Teaching Certification

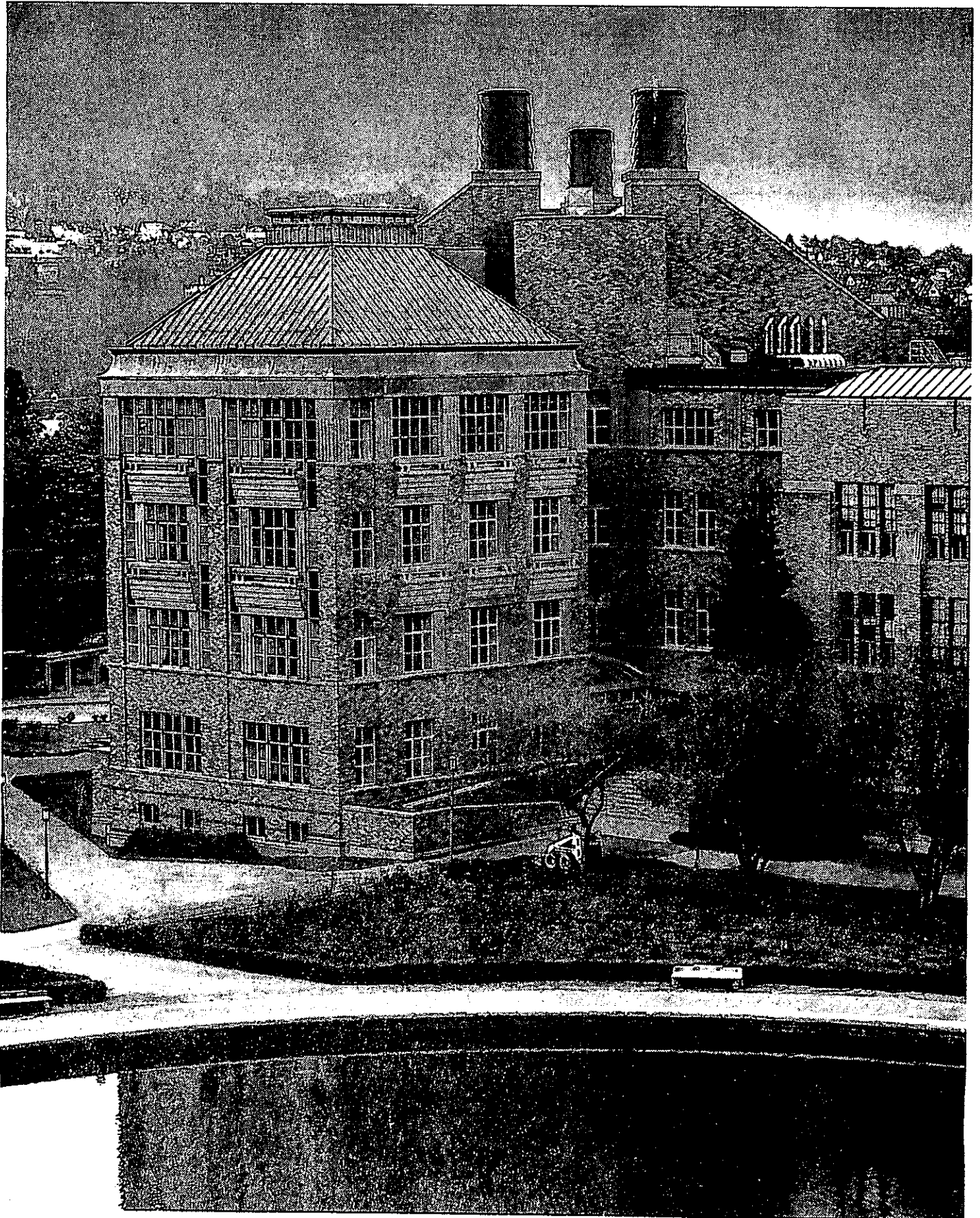
The College of Education offers professional programs approved by the State Board of Education leading to teaching and other certificates. Additional information appears in the College of Education section of this catalog, or the student may write to the Office of Teacher Education, 211 Miller, Box 353600.

Commencement

Formal commencement exercises are conducted at the close of spring quarter. During April of each year, commencement information is sent to each student entitled to participate the following June (i.e., those who graduated the previous August, December, or March and those who anticipate graduating in the current June and August).

Diploma Distribution

Diplomas are available 12 weeks after the end of the quarter in which they are earned.



THE GRADUATE SCHOOL: GRADUATE STUDY

Vice Provost and Dean

Marsha L. Landolt

Associate Dean for Academic Programs and Research

Dale E. Johnson

Associate Dean for Minority Education

Julius Debro

Associate Dean for Student Services and Fellowships

Elizabeth L. Feetham

Assistant Dean and Director, Center for Instructional Development and Research

Jody D. Nyquist

Director, Graduate Admissions

Joan W. Abe

In 1885, the University of Washington awarded its first graduate degree, a Master of Arts in the field of classical languages. In 1914, the University awarded its first Doctor of Philosophy degree, in the field of chemistry. The University has conferred more than 65,000 master's degrees and 14,000 doctoral degrees, exclusive of medical, dental, and first legal doctorates.

The Graduate School was created in 1899 and was established permanently in 1910. Its purposes are to define and support excellence in graduate education, and the research and scholarly activities associated with it. Through graduate programs, the University fulfills several functions vital to a healthy society: by fostering research, it advances human knowledge; by educating scholars and teachers and by training professionals, it makes information and help available to the various sectors of the public; and, by virtue of all of these, it contributes to the resolution of the problems and needs of society.

Graduate study is guided by the Dean of the Graduate School and a Graduate Faculty of over 2,700 members, selected for their scholarly and research qualifications and their concern with graduate education. Eight thousand graduate students are now in residence, working toward master's or doctoral degrees. Programs in the Graduate School leading to master's and doctoral degrees are offered in 84 departments or other organizational units of the University. The Graduate School directly sponsors 11 interdisciplinary graduate degree programs by organizing Graduate School groups of interested faculty members and assisting them in developing such programs. This includes a small Special Individual Ph.D. program for approved uniquely interdisciplinary dissertations. It also is the administrative home of the Graduate School of Library and Information Science and its degree program.

Acting through an elected council that advises the Dean, the Graduate Faculty establishes Graduate School policies. Each degree-offering unit within the University appoints a graduate program coordinator, who serves as an important link between the unit and the Graduate School. Students are advised to seek the help of the graduate program coordinator about questions concerning Graduate School and departmental degree requirements.

The Graduate School also has a number of responsibilities that relate to its primary ones, such as graduate program review, the administration of the Graduate School Fund and certain fellowship programs, as well as such central facilities as the University of Washington Press, and the Walker-Ames and the Jessie and John Danz distinguished visiting professorships.

The University is committed to providing greater opportunities for advanced study by women and members of ethnic minority groups. Within the Graduate School, the Minority Education Division actively solicits applications for admission, facilitates their review, and helps with various procedures related to the enrollment of minority graduate students. The division offers financial aid to students who need such help. In addition to a special appropriation of funds by the Washington State Legislature to encourage the recruitment and retention of ethnic minority students in areas of underrepresentation, the division administers several federal and private scholarship programs which provide financial aid and contribute to the overall environment of support for minority graduate students.

Graduate Degree Programs

Graduate degree programs are reviewed by the Graduate School on a ten-year cycle, or at predetermined shorter intervals. For further information, see Graduate School Memorandum No. 7, Periodic Review of Existing Degree Programs, or contact the Academic Programs Office in the Graduate School.

College of Architecture and Urban Planning

Architecture
Building Construction
Landscape Architecture
Urban Design and Planning

M.Arch.
M.S.B.C.
M.L.A.
M.U.P.

College of Arts and Sciences

Anthropology
Applied Mathematics
Art
Art History
Asian Languages and Literature
Astronomy
Atmospheric Sciences
Botany
Chemistry
Classics
Communications
Comparative Literature
Dance
Drama
Economics
English

M.A., Ph.D.
M.S., Ph.D.
M.F.A.
M.A., Ph.D.
M.A., Ph.D.
M.S., Ph.D.
M.S., Ph.D.
M.S., Ph.D.
M.S., Ph.D.
M.A., Ph.D.
M.A., M.C., Ph.D.
M.A., Ph.D.
M.F.A.
M.F.A., Ph.D.
M.A., Ph.D.
M.A., M.A.T., M.F.A., Ph.D.

Genetics
Geography
Geological Sciences
Geophysics
Germanics
History
International Studies

M.S., Ph.D.
M.A., Ph.D.
M.S., Ph.D.
M.S., Ph.D.
M.A., Ph.D.
M.A., Ph.D.
M.A.I.S.

(includes China Studies; the Comparative Religion Program; International Studies; Japan Studies; Korea Studies; Middle Eastern Studies; Russian, East European, and Central Asian Studies; and South Asian Studies)

Linguistics
Mathematics
Music

M.A., Ph.D.
M.A., M.S., Ph.D.
M.A., M.M., D.M.A., Ph.D.

Near Eastern Languages and Civilization
Philosophy
Physics
Political Science
Psychology

M.A.
M.A., Ph.D.
M.S., Ph.D.
M.A., Ph.D.
M.S., Ph.D.

Romance Languages and Literature
Scandinavian Languages and Literature
Slavic Languages and Literature

M.A., Ph.D.
M.A., Ph.D.

Sociology
Speech and Hearing Sciences
Speech Communication
Statistics
Zoology

M.A., Ph.D.
M.S., Ph.D.
M.A., Ph.D.
M.S., Ph.D.
M.S., Ph.D.

Graduate School of Business Administration Accounting

M.B.A., Ph.D.
M.P.Acc.

School of Dentistry Oral Biology

M.S.D.
M.S., Ph.D.

College of Education

M.Ed., Ed.D., Ph.D.

College of Engineering Aeronautics and Astronautics

M.S., M.S.E., M.Eng.
M.Eng., M.S.A.A., Ph.D.

Chemical Engineering
Civil Engineering

M.S.Ch.E., Ph.D.
M.S., M.S.Civ.E., M.S.E., Ph.D.

Computer Science and Engineering
Electrical Engineering
Materials Science and Engineering

M.S., Ph.D.
M.S.E.E., Ph.D.
M.S., M.S.M.S.E., Ph.D.

Mechanical Engineering

M.S.E., M.S.M.E., Ph.D.
M.S.

Technical Communication

College of Engineering and School of Medicine Bioengineering

M.S., M.S.E., Ph.D.

College of Forest Resources

M.F.R., M.S., Ph.D.

Graduate School

Behavioral Neuroscience
Biology Teaching
Health Services Administration
Library and Information Science
Molecular and Cellular Biology
Mussology
Near and Middle Eastern Studies
Nuclear Engineering
Nutritional Sciences
Quantitative Ecology and Resource Management
Special Individual Program
Urban Design and Planning

Ph.D.
M.A.T.
M.H.A.
M.Libr.
Ph.D.
M.A.
Ph.D.
M.S.N.E., Ph.D.
M.S., Ph.D.
M.S., Ph.D.
Ph.D.
Ph.D.

School of Law

LL.M., Ph.D.

School of Medicine

Biochemistry
Biological Structure
Immunology
Laboratory Medicine
Medical History and Ethics
Microbiology
Molecular Biotechnology
Pathology
Pharmacology
Physiology and Biophysics
Rehabilitation Medicine

M.S., Ph.D.
M.S., Ph.D.
M.S., Ph.D.
M.S.
M.A.
M.S., Ph.D.
Ph.D.
M.S., Ph.D.
M.S., Ph.D.
M.S., Ph.D.
M.P.T., M.R.M., M.S.

School of Nursing

M.N., M.S., Ph.D.

College of Ocean and Fishery Sciences

Fisheries
Marine Affairs
Oceanography

M.S., Ph.D.
M.M.A.
M.S., Ph.D.

School of Pharmacy Medicinal Chemistry Pharmaceuticals

M.S., Ph.D.
M.S., Ph.D.
M.S., Ph.D.

Graduate School of Public Affairs

M.P.A.

School of Public Health and Community Medicine	M.S., Ph.D.
Biostatistics	M.S., Ph.D.
Environmental Health Epidemiology	M.P.H., M.S., Ph.D.
Health Services	M.P.H., M.S., Ph.D.
Pathobiology	M.S., Ph.D.

School of Social Work	M.S.W.
Social Welfare	Ph.D.

Because the following professional doctoral degrees offered by the University are not considered to be graduate degrees, they are not administered through the Graduate School.

School of Dentistry	D.D.S.
School of Law	J.D.
School of Medicine	M.D.
School of Pharmacy	Pharm.D.

Graduate Admissions

The Office of Graduate Admission
98 Gerberding, Box 351280
University of Washington
Seattle, WA 98195-1280
(206) 543-5929; FAX (206) 543-8798
email: uwgrad@u.washington.edu (U.S. citizens and residents) or
intlgrad@u.washington.edu (international).
Additional program information is available on the World Wide Web at <http://www.washington.edu>.

The UW provides equal opportunity in education without regard to race, color, creed, religion, national origin, sex, sexual orientation, age, marital status, disability, or status as a disabled or Vietnam era veteran in accordance with UW policy and applicable federal and state statutes and regulations. In addition, sustained efforts are made to include qualified students who are members of groups that have been subject to discrimination or who are underrepresented in certain disciplines.

You may apply to the UW through the Office of Graduate Admissions in three ways. It is important to understand the distinctions between the categories.

• A **graduate student** is a person working toward a master's or doctoral degree or earning a school administrator's credential. Students must be admitted to this status in order to earn a degree. The Application for Admission to the Graduate School is obtained from the program to which you wish to apply.

• A **visiting graduate student** is a person who plans to transfer graduate credits earned at the UW to another institution where he or she is actively pursuing a graduate degree. Admission is based in part on availability of resources. Visiting graduate applicants must have been admitted to another recognized graduate school, be currently pursuing a graduate degree, and in good standing. Although transcripts need not be provided with the application, a Certificate of Status signed by the home institution is required. The Application and Certificate should be obtained directly from the Office of Graduate Admissions at the address above.

• Some graduate programs have chosen to offer admission to **graduate nonmatriculated students**. These students are not presently seeking a graduate degree but may wish to apply a maximum of 9 credits earned in this category to degree requirements should they later be accepted into a graduate program. Applicants should meet minimum Graduate School admission requirements but admission as a graduate nonmatriculated student does not imply admission to a graduate degree program. The Application to Graduate Nonmatriculated Status must be obtained from the program to which you wish to apply. Official sealed transcripts from all collegiate institutions previously

attended must be sent to the Graduate Nonmatriculated Office, Box 351280, University of Washington, Seattle, WA 98195-1280. (Refer to Graduate School Memorandum #37 for further information.)

Admission to the UW is necessarily a selective process. The prospective student must hold a baccalaureate degree from an accredited college or university in this country or its equivalent from a foreign institution. The student's record should be a strong one with an average grade of B or a 3.00 grade-point, or better. The primary criterion and the priority for admission of new applicants into a graduate program is the applicant's ability, as decided by the appropriate faculty, to complete the graduate program expeditiously with a high level of achievement. One aspect of meeting this criterion is the matching of interests between applicants and faculty. Also to be considered is maintenance of a diverse student body within the Graduate School and the individual programs.

Factors which may be considered during the admissions process include:

- Undergraduate grades, especially for subjects in or closely related to the field of the proposed graduate study.
- Consistency in completing an undergraduate degree program.
- Required test scores.
- Personal interviews.
- Career objectives and the ability of the graduate program to prepare a student for them.
- Degree objectives.
- Written and oral recommendations from those qualified to evaluate the applicant's academic record and promise.

Importance given to these factors will vary among degree programs.

Most Graduate School admissions are for summer or autumn quarters. Admissions for winter and spring quarters may be severely restricted due to considerations of space. The following are graduate admissions closing dates. *It is important to remember that individual departments often have much earlier deadlines which supersede those listed below, particularly for autumn quarter.*

- Autumn Quarter—July 1
- Winter Quarter—November 1
- Spring Quarter—February 1
- Summer Quarter—May 15

Each academic program at the UW has a Graduate Program Coordinator who is responsible for providing advice, guidance, and assistance to applicants as well as to students working toward graduate degrees. Prospective graduate students are urged to contact the Graduate Program Coordinator in their program of interest for information about any aspect of graduate study, including research, curriculum, faculty, and financial support in the form of teaching and research assistantships, grants, and scholarships.

Admission Process

The application forms for both graduate and graduate nonmatriculated status must be obtained from the Graduate Program Coordinator. Visiting graduate applications are available from the Office of Graduate Admissions. *It is very important to submit all application documents in time to meet departmental deadlines as these will supersede graduate admissions deadlines.*

Required Examinations

The Graduate Record Examination (GRE) is required for admission as a graduate student except in the following circumstances:

- Applicants to Art, Dance, Drama, and to the Master of Music and Doctor of Musical Arts degree in Music.
- Applicants holding earned doctorates (such as Ph.D., D.D.S., M.D., Ed.D., J.D.) from U.S. institutions.
- Applicants to the M.B.A. or M.P.Acc. degrees in the School of Business Administration, who must submit scores from the Graduate Management Admission Test (GMAT).

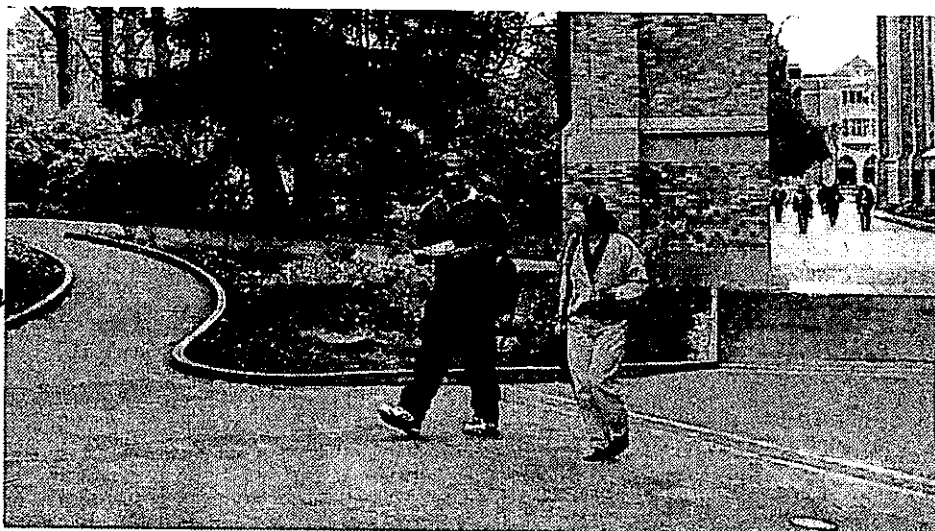
Scores must be received directly from the Educational Testing Service.

For further information you may write to:
Graduate Record Examinations
Educational Testing Service
P.O. Box 6000
Princeton, NJ 08541-6000
(609) 771-7670 or (510) 654-1200

International Applicants

The international division email address is: intlgrad@u.washington.edu (international). You may also refer to the World Wide Web at <http://www.washington.edu> for further information.

In addition to the other requirements for all applicants, a minimum score of 500 on the Test of English as a Foreign Language (TOEFL) must be presented by applicants who are not citizens of the United States unless they meet one of the following exceptions:



THE GRADUATE SCHOOL: GRADUATE STUDY

• Citizens of Australia, Canada, Ireland, New Zealand, or the United Kingdom.

• Applicants holding bachelor's or advanced degrees from accredited institutions in the U.S. or in one of the countries listed above.

Applicants offered admission with TOEFL scores between 500 and 580 will be required to fulfill an English as a Second Language (ESL) requirement.

With the exception of citizens of the countries listed above, all international and immigrant status applicants who intend to apply for teaching assistantships must also take the Test of Spoken English (TSE).

Due to the time required for evaluation of applications, overseas applicants for autumn quarter are strongly encouraged to submit the application and transcripts to the Office of Graduate Admissions no later than the prior December 1. Applications received after this date will be processed as soon as possible but significant delays may result.

Registration

After successful applicants have been offered admission, the Registration Office sends a request for a \$100 Enrollment Confirmation Deposit to indicate the intent to register. This nonrefundable fee will apply toward the first quarter's tuition.

The University provides registration services through STAR (Student Telephone Assisted Registration), a touchtone telephone registration system. See the quarterly *Time Schedule* for detailed information and procedures.

Once admitted, graduate students are expected to maintain registered or on-leave status until the degree is conferred. (See section on Continuous Enrollment.)

Financial Aid for Graduate Students

Students applying for fellowships, traineeships, and assistantships or associateships must make certain that complete transcripts and other credentials are on file by February 15 (earlier submission of applications and supporting documents is urged by all departments and required by some). Awards and appointments are usually made about April 1. Application forms may be obtained by writing to the graduate program coordinator of the appropriate department.

Fellowships, Traineeships, and Scholarships

A limited number of fellowships, traineeships, and scholarships are available through the Graduate School or through individual departments to outstanding students in fields of study leading to advanced degrees. Application forms may be obtained from the graduate program coordinators in the departments or from the Fellowship and Assistantship Division in the Graduate School.

The Graduate School also provides computer searches to assist enrolled graduate students, faculty, and staff in locating fellowships, grants, and other sources of funding. The data base contains over 3,000 awards from foundations, government agencies, associations, and other non-University organizations. These awards are made on a national competitive basis, and application must be made directly to these foundations or organizations.

Graduate Student Service Appointments

The University provides for the employment of many graduate students as teaching, research, and staff assistants, predoctoral associates, predoctoral instruc-

tors, and predoctoral lecturers. Approximately 2,000 such appointments were made during the past year.

The University's policy regarding these appointments is set forth in detail in Executive Order 28. Copies of this statement are available from the graduate program coordinator or the Graduate School. Some of the information is provided below.

Appointments are granted only to graduate students who have carefully defined educational goals and who exhibit the highest intellectual competence and attainment. Succeeding appointments may be made if the student maintains high scholarship and continues to make satisfactory progress toward the degree.

Graduate appointments are granted to graduate students only. An initial appointment may be offered to a student before being admitted formally to the Graduate School, but the appointment is contingent upon admission to graduate status before the beginning of the appointment.

1995-96 Graduate Student Service Appointments

Students holding these appointments for at least 20 hours per week and for five of the six pay periods of an academic quarter will receive a waiver of the operating fee portion of "tuition and fees" and will be required to pay approximately \$130 tuition per quarter.

*Salary for Half-time Service
(20 hours per week)*

Effective September 16, 1995—September 15, 1996

Title	Monthly Academic salary	year salary
Teaching Assistant	\$1,046	\$ 9,414
Predocutorial Teaching Associate I	1,121	10,089
Predocutorial Teaching Associate II	1,208	10,872
Predocutorial Instructor*	1,208	10,872
Predocutorial Lecturer*	1,208	10,872
Research Assistant	1,046	9,414
Predocutorial Research Associate I	1,121	10,089
Predocutorial Research Associate II	1,208	10,872
Predocutorial Researcher*	1,208	10,872
Graduate Staff Assistant	1,046	9,414
Predocutorial Staff Associate I	1,121	10,089
Predocutorial Staff Associate II	1,208	10,872
* Minimum		

Graduate students appointed to the beginning level of graduate teaching appointments are not permitted to be in overall charge of a course, but are given an appropriate degree of responsibility and supervision of laboratory or classroom work so that they may be introduced to teaching activities gradually and effectively. Student appointees may also serve as assistants in research activities for which a faculty member is responsible.

Two special categories for teaching appointments and one for research appointments are provided above the predoctoral associate level: predoctoral instructor, for the graduate student who has achieved Candidate status and is ready for increased teaching responsibility; predoctoral lecturer, for a mature and competent graduate student who, though he or she need not be a Candidate, has had exceptional previous teaching or other professional experience; and predoctoral researcher, for the student who has special skills or qualities obtained outside of his or her experience as a graduate student or who carries major responsibilities in relation to research activities. For the 1995-96 academic year these appointments carry a minimum stipend of \$1,208 per month (half-time) with no designated maximum so that the stipend may be adjusted to a level appropriate to the appointee's experience and his or her teaching and research responsibilities.

International students with teaching appointments (teaching assistant, predoctoral teaching associate I

and II, predoctoral instructor, predoctoral lecturer) must meet a spoken-English requirement before they may be given classroom duties.

An additional series of appointments titled Graduate Staff Assistant and Predocutorial Staff Associates I and II is provided for University service activities that are not appropriately described as teaching or research but are closely related to the student's field of advanced study. Appointments of specific graduate students to these positions may not be made until after the position itself has been specifically approved.

Students who hold any of the above appointments are required to render 20 hours of service per week to the University. The appointments may be on a 9-month basis and ordinarily cover the period from September 16 through June 15. Some of these appointments may be extended to 11 or 12 months. Graduate student appointments do not provide for paid vacations or sick leave. Students who accept these University service appointments normally confine their employment to such appointments.

A graduate student service appointee must register for, and carry throughout each quarter except summer quarter, a minimum of 9 credits in formal courses or in research, thesis, or dissertation work. These credits must be in courses that are applicable toward an advanced degree.

Work Study Graduate Assistantships

Graduate students who are eligible for the need-based college work study program may qualify for work study graduate assistantships in teaching or research. Students must submit financial aid applications to the Office of Student Financial Aid by the February 28 deadline to be considered for these positions. Information is available from the Office of Student Financial Aid.

Employment Opportunities

The campus offers other job opportunities for graduate students. Students may apply directly to the chair of the department in which they hope to work or to the Student Employment Office. Students seeking part-time employment must be enrolled and on campus before they may obtain jobs.

Advisory positions in University residence halls paying room and board are available for single graduate students, both men and women. Additional information may be obtained from the Director of Residence Halls Programs, 301 Schmitz.

Spouses of married students also may apply for regular full- and part-time University employment. These positions cover a wide range of occupations and offer pay comparable to the prevailing salaries in the community. Some carry such fringe benefits as vacations, sick leave, and opportunities to enroll in University courses. Inquiries may be directed to the Staff Employment Office, 1320 Northeast Campus Parkway, Seattle.

Loans

Long-term educational loans are available to graduate students through the Federal Perkins Student Loan and the Federal Direct Loan programs.

The Federal Perkins Student Loan Program usually provides a maximum annual loan to graduate students of \$3,000 and bears an interest rate of five percent. There are certain cancellation provisions in the Federal Perkins Student Loan Program for combat-zone service and teachers of special-need or disadvantaged students. Application forms for this program (the Free Application for Federal Student Aid, or FAFSA) are available in the Office of Student Financial Aid, Box 355850, 105 Schmitz, telephone (206) 543-6101. The application deadline is February 28 for the following autumn quarter.

Students should meet the application deadline even if they have not yet been admitted to the Graduate School.

The Federal Direct Loan Programs (Federal Direct Stafford Loan and Federal Direct Unsubsidized Stafford Loan) are borrowed directly from the federal government. The University will coordinate all eligibility paperwork; students must complete the FAFSA to be considered. The subsidized Federal Direct Stafford Loan is awarded to students who demonstrate financial need. Students who do not qualify for need-based assistance may qualify for Federal Direct Unsubsidized Stafford Loans. The principal of both types of loans must be repaid, generally beginning 6-9 months after the student leaves school. Subsidized Stafford Loans are interest-free until repayment actually begins. The unsubsidized Stafford Loan is not interest-free. The borrower may make interim interest payments or may request that interest be added to the principal of the loan (this is called "capitalization"). The interest rate on both loans is variable, but capped at 8.25%. Graduate and professional students may borrow up to \$8,500 in subsidized and/or unsubsidized loans per year; up to an additional \$10,000 per year may be available in unsubsidized loans (based on cost of attendance and other assistance received).

Short-term emergency loan funds also are available through the Office of Student Financial Aid. Several different types of short-term loans are possible, from \$500 interest-free loans to approximately \$1,000 loans at 6% interest. In an emergency, students may also borrow the amount equal to resident graduate tuition or may borrow against their next aid disbursement. Students may have no more than \$2,400 in short-term loans outstanding at any time. More information is available from the Office of Student Financial Aid, Short-Term Loans, 172 Schmitz, 685-1282.

Financial Aid for Ethnic Minority Graduate Students

The Minority Education Division of the Graduate School administers a variety of fellowships and assistantships based on need and on merit. Financial support is open to men and women whose ethnic origin is either Black/African American, American Indian/Alaskan Native, Asian American/Pacific Islander, or Hispanic/Mexican American. These awards are generally made through the nomination and support of the department in which the student is enrolled. Students must be U.S. citizens or permanent residents to be eligible. Supplemental awards ranging from \$250 to \$1,000 are based upon an evaluation of the student's need as established by the Free Application for Federal Student Aid (FAFSA) and the University's Office of Student Financial Aid. A limited number of tuition scholarships are also available.

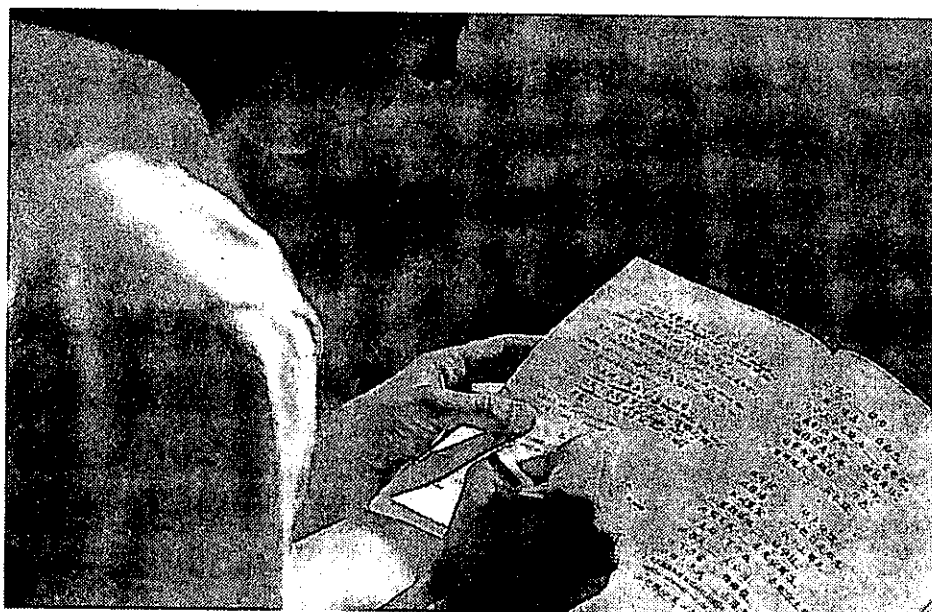
Financial assistance from individual departments may also be available, and students should apply directly to the chair of their department.

Further information may be obtained by writing the University of Washington, Graduate School, Minority Education Division, Box 351240, Seattle, WA 98195-1240

All awards are contingent upon the student's admission to the UW Graduate School.

Graduate Degree Policies

Usually focused on a specific field of knowledge, graduate study is conducted through a variety of means, including lectures, seminars, independent advanced study, special reading courses, internships, and participation in research. Graduate programs leading to the Master of Arts, Master of Science, or Doctor of Philosophy degrees emphasize the development of the student's ability for independent scholarly work and the creation of new knowledge through research. Practice-oriented programs, which ordinarily lead to the degree of master or doctor in a particular professional field,



emphasize preparation of the student for professional practice at the frontiers of existing knowledge.

Many master's and all doctoral programs culminate in the presentation of a thesis or dissertation conveying the results of the independent study and research carried out by the student. A master's thesis contributes to knowledge, reviews or critiques the state of knowledge in a field, creates a new design or composition, or represents some other appropriate kind of independent contribution. A doctoral dissertation must set forth a significant contribution to knowledge or understanding in the student's field, be presented in scholarly form, and demonstrate that the student is competent to engage independently in the pursuit of solutions to important problems. The student must defend the doctoral dissertation in a Final Examination conducted by a faculty committee and open to all other Graduate Faculty members. A member of the Graduate Faculty from some other discipline participates as an official representative of the entire Graduate Faculty in all aspects of the student's program, including various major evaluations such as the General Examination and Final Examination.

Graduate Program Coordinator

The graduate student's initial work at the University is guided by the graduate program coordinator in his or her field. The coordinator must be a senior tenured member of the Graduate Faculty and is the official representative of the academic unit that offers the graduate degree program. The graduate program coordinator maintains familiarity with policies and procedures of the Graduate School and provides overall coordination of graduate activities within the unit.

Graduate Courses

Graduate courses are intended for, and ordinarily restricted to, either students enrolled in the Graduate School or graduate nonmatriculated students, and are given numbers from 500 through 800. Some courses at the 300 and 400 levels are open both to graduates and to upper-division undergraduates. Such courses, when acceptable to the supervisory committee and the Graduate School, may be part of the graduate program. The Graduate School accepts credit in approved 300-level courses for the minor or supporting fields only. Courses at the 300 level are not included in the calculation of grade-point average (GPA) and will not apply toward the minimum Graduate School requirement of 18 graded credits for the master's or doctoral degree. Approved 400-level courses are ac-

cepted as part of the major as well as minor or supporting fields. Courses numbered 498 and entitled Special Topics or Special Projects normally are not applicable to a graduate degree program if addressed primarily to introductory content and undergraduate students. Undergraduate research (499) is not accepted as part of the graduate program. Graduate School Memorandum No. 36 offers additional information on graduate courses. With the exception of summer, students are limited to a maximum of 9 credits per quarter of any combination of courses numbered 600, 700, or 800.

Repeating Courses

Graduate students may repeat any course. Both the first and second grades will be included in the cumulative GPA. Subsequent grades will not be included, but will appear on the permanent record. The number of credits earned in the course will apply toward degree requirements only once.

Grading System for Graduate Students

In reporting grades for graduate students, units that offer graduate degrees use the system described herein. Grades are entered as numbers, the possible values being 4.0, 3.9, ... and decreasing by one-tenth until 1.7 is reached. Grades below 1.7 are recorded as 0.0 by the Registrar and do not count toward residency, total credit count, or grade and credit requirements. A minimum of 2.7 is required in *each course* that is counted toward a graduate degree. A minimum GPA of 3.00 is required for graduation.

Correspondence between number grades and letter grades is as follows:

Numeric grade-point equivalent	Letter grade	Numeric grade-point equivalent	Letter grade
4.0	A	2.8	B-
3.9		2.7	
3.8	A-	2.6	
3.7		2.5	
3.6		2.4	C+
3.5		2.3	
3.4	B+	2.2	
3.3		2.1	
3.2		2.0	C
3.1		1.9	
3.0	B	1.8	
2.9		1.7	
		1.6-0.0	E

THE GRADUATE SCHOOL: GRADUATE STUDY

The following letter grades also may be used:

I Incomplete. An Incomplete may be given only when the student has been in attendance and has done satisfactory work to within two weeks of the end of the quarter and has furnished proof satisfactory to the instructor that the work cannot be completed because of illness or other circumstances beyond the student's control. A written statement giving the reason for the incomplete and indicating the work required to remove it must be filed by the instructor with the head of the unit in which the course is offered.

To obtain credit for the course, a student must successfully complete the work by the last day of the next quarter in residence. This rule may be waived by the Dean of the college in which the course is offered. In no case may an incomplete be converted into a passing grade after a lapse of two years or more. An incomplete received by a graduate student does not automatically convert to a 0.0 but will remain a permanent part of the student's record.

N No grade. Used only for hyphenated courses and courses numbered 600 (Independent Study or Research), 601 (Internship), 700 (Master's Thesis), 750 (Internship), or 800 (Doctoral Dissertation). An N grade indicates that satisfactory progress is being made, but evaluation depends on completion of the research, thesis, internship, or dissertation, at which time the instructor or supervisory committee chair should change the N grade(s) to one reflecting the final evaluation.

S/NS Satisfactory/not satisfactory. A graduate student, with the approval of the graduate program coordinator or supervisory committee chair, may elect to be graded S/NS in any numerically graded course for which he or she is eligible. The choice must be indicated at the time of registration or by the tenth day of the quarter. (As with all registration changes, a \$20 change fee will be charged beginning the second week of the quarter.) Only in very unusual cases may S/NS grades be converted to numeric grades or vice versa. The instructor submits a numeric grade to the Registrar's Office for conversion to S (numeric grades of 2.7 and above) or NS (grades lower than 2.7).

CR/NC Credit/no credit. With the approval of the faculty in the academic unit, any course may be designated for grading on the credit/no credit basis by notice in the appropriate *Time Schedule*. For such courses, the instructor submits a grade of CR or NC to be recorded by the Registrar's Office for each student in the course at the end of the quarter. All courses numbered 600, 601, 700, 750, and 800 may be graded with a decimal grade, a CR/NC, or N at the instructor's option.

W Withdrawal. Official withdrawal from a course may be done by calling STAR through the seventh week of the quarter. During the first two weeks of the quarter no entry is made on the permanent academic record. The third week through the seventh week of the quarter, a W is recorded on the transcript. Refer to the *Time Schedule* after the seventh week of the quarter.

HW Hardship withdrawal. Grade assigned when a graduate student is allowed a hardship withdrawal from a course after the seventh week of the quarter.

Unofficial withdrawal from a course shall result in a grade of 0.0.

The grades of W and HW count neither as completed credits nor in computation of the GPA.

Of the minimum number of credits required for a graduate degree, a graduate student must show numerical grades in at least 18 quarter hours of course work taken at the UW. These numerical grades may be earned in approved 400-level courses and 500-level courses.

The student may petition the Dean of the Graduate School to modify the procedures described above. The petition should be accompanied by comments and

recommendations from the graduate program coordinator or supervisory committee chair.

Scholarship

A cumulative GPA of 3.00 or above is required to receive a degree from the Graduate School. A graduate student's GPA is calculated entirely on the basis of numeric grades in 400- and 500-level courses. The grades of S, NS, CR, NC, and N are excluded, as are all grades in courses numbered 600, 601, 700, 750, and 800, and in courses at the 100, 200, and 300 levels.

Failure to maintain a 3.00 GPA, either cumulative or for a given quarter, constitutes low scholarship and may lead to a change-in-status action by the Graduate School. Failure to maintain satisfactory performance and progress toward a degree may also result in a change-in-status action by the Graduate School.

(See Graduate School Memorandum No. 16 for additional information.)

Withdrawal Policy

1. During the first two weeks of the quarter, graduate students may withdraw from all courses for any reason, by filing an appropriate form with the Registration Office either in person or by mail, or by calling STAR. The date of complete withdrawal is recorded on the student's transcript.

2. Starting the third week of the quarter, a grade of W is recorded when graduate students drop any course or withdraw completely.

3. Graduate students have until the end of each quarter to withdraw completely from all courses.

4. The withdrawal schedule shown above applies to quarters of the regular academic year. The deadlines for summer quarter are established by the Dean of Summer Quarter.

5. Unofficial withdrawal from a course results in a grade of 0.0.

Language Competence Requirements and Examinations

Competence in one or more languages in addition to English is desirable for all fields of advanced study and is often required, especially in the scholarly and research-oriented programs leading to the degrees of Master of Arts, Master of Science, and Doctor of Philosophy.

Requirements for foreign-language competence are established by the Graduate Faculty in the unit offering the graduate program. Language competence in certain languages other than English (i.e., languages that may have special significance to the field) may be specified as helpful or desirable or may be required. Students should consult the graduate program coordinator for information and advice about desirable or required competence in foreign languages.

When appropriate, students are urged to establish foreign-language competence as undergraduates before entering the Graduate School or as early as possible in their graduate careers. The University's language competence requirements in French, German, and Spanish may be satisfied by successful completion of the standardized examinations given by the Educational Testing Service (ETS). These examinations are given at the University and elsewhere throughout the United States. For other foreign languages, examinations are given at the UW.

It is assumed that students from English-speaking countries who are admitted to the Graduate School are competent in the English language; students from non-English-speaking countries must demonstrate a satisfactory command of English, both for admission and for appointment as teaching assistants.

Residence

The residence requirement for the master's degree is one year (three full-time quarters). Students registered for fewer than 9 credits per quarter may add part-time quarters together to achieve the equivalent of one full-time quarter (9 or more credits) to be applied toward fulfilling residence requirements. However, excess credits beyond 9 may not be subtracted from one quarter and added to another.

For the doctoral degree, the residence requirement is three years (nine full-time quarters), two of them at the UW. One of the two years must be spent in continuous full-time residence (three full-time quarters out of any four consecutive quarters). The residence requirement for the doctoral degree cannot be met solely with summer or part-time study. With the approval of the degree-granting unit, an appropriate master's degree from an accredited institution may be applied toward one year of resident study other than the continuous full-time year of study.

Once a student is admitted to a graduate degree program, a full quarter of residence is granted for any quarter in which at least 9 credits in graduate course, research, thesis, internship, or dissertation work are satisfactorily completed.

With the exception of the continuous full-time year of study requirement for the doctoral degree, students registered for fewer than 9 credits per quarter may add part-time quarters together to achieve the equivalent of one full-time quarter (9 or more credits) to be applied toward fulfilling residence requirements. However, excess credits beyond 9 may not be subtracted from one quarter and added to another.

Only courses numbered 400, 500, 600, 700, and 800 can be applied to residence or course credit in the major field for advanced degrees (please see Graduate Courses earlier in this section regarding courses numbered 498 and 499). Courses numbered 300 are not applicable to residence or course credit toward advanced degrees except when applied by permission of the graduate program coordinator or supervisory committee toward the graduate minor or supporting courses. Courses numbered below 300 are not applicable to residence or course credit for advanced degrees.

Final Quarter Registration

A student must maintain registration as a full- or part-time graduate student at the University for the quarter the master's degree, the Candidate certificate, or doctoral degree is conferred.

A student who does not complete all degree requirements by the last day of the quarter must be registered for the following quarter.

Continuous Enrollment and Official On-Leave Requirement

Policy

To maintain graduate status, a student must be enrolled on a full-time, part-time, or On-Leave basis from the time of first enrollment in the Graduate School until completion of all requirements for the graduate degree. This includes applying for the master's degree, the passing of the master's final examination or doctoral general or doctoral final examinations, the filing of the thesis or dissertation, and the receiving of the degree. Summer quarter On-Leave enrollment is automatic for all graduate students who were either registered or On-Leave the prior spring quarter. Failure to maintain continuous enrollment constitutes evidence that the student has resigned from the Graduate School.

A student's petition for On-Leave status must be approved by the departmental graduate program coordinator or alternate and submitted to the Registrar's

office no later than the fifth day of the quarter. To be eligible for On-Leave status, the student must have registered for, and completed, at least one quarter in the UW Graduate School and have been registered or On-Leave for the immediate past quarter (excepting summer). An On-Leave student is entitled to use the University Libraries and to sit for foreign-language competence examinations, but is not entitled to any of the other University privileges of a regularly enrolled and registered full- or part-time student. The student pays a nonrefundable fee to obtain On-Leave student status covering four successive academic quarters or any part thereof. An On-Leave student returning to the University on or before the termination of the period of the leave must file a Former Student Enrollment Application (available at 225 Schmitz) by the deadline stated on the form and register in the usual way as a full- or part-time student (see Graduate School Memorandum No. 9 for procedures). A student who returns before the termination of the On-Leave period and maintains registration for any part of a quarter cancels On-Leave status. Please note: Periods spent On-Leave are included as part of the maximum time periods allowed for completion of a graduate degree.

Readmission

A student previously registered in the Graduate School who has failed to maintain graduate student status but who wishes later to resume studies must file an application in person or by mail for readmission to the Graduate School by the regularly published closing dates. If the student is readmitted, registration will occur during the usual registration period. If the student has attended any other institution during the period when not registered at the UW, official transcripts in duplicate of the student's work must be submitted. An application for readmission carries no preference and is treated in the same manner as an application for initial admission, including the requirement of payment of the application fee.

The Graduate School normally allows six years to complete requirements for a master's degree and ten years for a doctoral degree. Periods spent On-Leave or out of status are included.

Concurrent Degree Programs

Concurrent programs are defined as a pair of programs that may be taken at the UW by a postbaccalaureate student resulting in the satisfaction of the requirements for either two graduate degrees or a graduate and a professional degree. Rather than

sequentially completing first one and then the other degree, the student's time and the University's resource allocations may sometimes be conserved by providing arrangements that permit the student to proceed in a coordinated way toward completion of the degree objectives.

To earn two master's degrees, a student must complete two separate sets of minimum Graduate School degree requirements of 36 credits each for a total of 72 credits. If a program requires more than 36 credits for the master's degree, a graduate student, with prior approval of both graduate programs, may apply a maximum of 12 credits beyond 36 earned in one program toward the master's degree in the second program. Thus, the minimum number of additional credits for the second degree, with these 12 approved credits, is 24. Up to 12 credits earned toward a Ph.D. degree may be counted toward a master's degree in another program with the approval of both degree-granting units.

Graduate School Memorandum No. 35, Concurrent Degree Programs (revised October, 1994), contains additional information and is available from the Academic Programs office in the Graduate School.

Master's Degree

Summary of Requirements

It is the responsibility of each master's candidate to meet the following Graduate School minimum requirements:

1. Under a thesis program, a minimum of 36 or more quarter credits (27 course credits and a minimum of 9 credits of thesis) must be presented. Under a nonthesis program, a minimum of 36 or more quarter credits of course work is required.
2. At least 18 of the minimum 36 quarter credits for the master's degree must be for work numbered 500 and above. (In a thesis program, 9 of the 18 must be course credits and 9 may be for 700, Master's Thesis.)
3. Numerical grades must be received in at least 18 quarter credits of course work taken at the UW. The Graduate School accepts numerical grades (a) in approved 400-level courses accepted as part of the major, and (b) in all 500-level courses. A minimum cumulative GPA of 3.00 is required for a graduate degree at the University.

4. A minimum of three full-time quarters of residence credit must be earned. Part-time quarters may be accumulated to meet this requirement (see detailed information under Residence).

5. In a thesis degree program, a thesis, approved by the supervisory committee, must be submitted to the Graduate School. A student must register for a minimum of 9 credits of thesis (700). With the exception of summer, students are limited to a maximum of 9 credits per quarter of thesis (700).

6. A final master's examination, either oral or written, as determined by the student's supervisory committee, must be passed, if it is a departmental requirement.

7. Any additional requirements imposed by the graduate program coordinator in the student's major department or by the student's supervisory committee must be satisfied. A master's degree student usually takes some work outside the major department. The graduate program coordinator in the major department or the student's supervisory committee determines the requirements for the minor or supporting courses.

8. The graduate student must apply for the master's degree at the Graduate School within the first two weeks of the quarter in which he or she expects the degree to be conferred, in accordance with Application for the Master's Degree, as described below.

9. The graduate student must maintain registration as a full- or part-time graduate student at the University for the quarter in which the degree is conferred (see detailed information under Final Quarter Registration).

10. All work for the master's degree must be completed within six years. This includes quarters spent On-Leave or out of status and applicable work transferred from other institutions (see detailed information under Transfer Credit).

11. A student must satisfy the requirements for the degree that are in force at the time the degree is to be awarded.

A second master's degree may be earned at the UW by completing an additional set of requirements. Please refer to Concurrent Degree Programs later in this section and to Graduate School Memorandum No. 35 (revised October, 1994) for more specific information.

Transfer Credit

A student working toward the master's degree may petition the Dean of the Graduate School for permission to transfer to the UW the equivalent of a maximum of 9 quarter credits of graduate level course work taken while a registered graduate student in another recognized graduate school. These credits may not have been used to satisfy requirements for another degree. The petition must include a written recommendation from the graduate program coordinator and an official transcript indicating completion of the course work. Transfer credits are not entered on the UW transcript.

Approved transfer credits are applied toward the total credit count for the master's degree only. (Transfer credits are not applicable toward a doctoral degree.) The minimum residence requirement of three quarters at the UW, the 18 quarter credits of numerically graded course work, and the 18 quarter credits of 500-level-and-above course work may not be reduced by transfer credit.

UW students who are within 6 credits of completing their undergraduate degree and who have met the requirements for admission to the Graduate School may register the quarter immediately preceding admission to Graduate School for up to 6 credits in 500-level courses in addition to the last 6 credits they require of undergraduate work. The graduate program which has admitted the student must approve registration for the courses. The student, after admission to the Graduate School, must file a petition with the Dean of the Graduate School to transfer the 6 credits.



THE GRADUATE SCHOOL: GRADUATE STUDY

Credit taken as a nonmatriculated student or postbaccalaureate student at the UW may not be transferred into a graduate program. Credit by either independent study through correspondence or advanced credit examinations is not transferable.

Thesis Program

The master's thesis should be evidence of the graduate student's ability to carry out independent investigation and to present the results in clear and systematic form. Two copies of the thesis, normally written in the English language, along with the appropriate forms signed by the members of the supervisory committee from the student's graduate program, must be submitted to the Graduate School by the end of the quarter in which degree requirements are completed. The faculty in the graduate program may require that the student present an additional copy for its own use. The Graduate School publishes a booklet, *Style and Policy Manual for Theses and Dissertations*, which outlines format requirements. This manual should be obtained from the Graduate School and read thoroughly before the student begins writing the thesis. The thesis must meet all format requirements before being accepted by the Graduate School. Thesis advisers are available in the Graduate School for consultation during the thesis preparation process.

A \$25 binding fee is payable at 129 Schmitz before the thesis is submitted to the Graduate School.

Nonthesis Programs

The faculty in some graduate programs has arranged programs of study for the master's degree that do not require the preparation of a thesis. These nonthesis programs normally include a more comprehensive plan of course work for more extensive examinations than are required in thesis programs, or they may include some approved research activity in lieu of a thesis.

Final Examination for Master's Degree

As soon as is appropriate, the faculty in the student's graduate program appoints a supervisory committee, consisting of two to four members, and the majority, including the chair, must be members of the Graduate Faculty (see Graduate School Memorandum No. 13). The committee chair arranges the time and place of the final examination, the results of which must be reported to the Graduate School by the last day of the quarter in which degree requirements are met. The examination may be oral or written, and all members of the supervisory committee must certify its results. At least two members of the committee must sign the Master's Application (warrant). If the examination is not satisfactory, the committee may recommend to the Dean of the Graduate School that the student be allowed to take another examination after a period of further study.

Application for Master's Degree

The student must apply for the master's degree at the Graduate School within the first two weeks of the quarter in which he or she expects to complete degree requirements. The filing of the application is the responsibility solely of the student. When the application is received, the student's record is reviewed in the Graduate School. All requirements for the degree must be met by the end of the current quarter if the application is to be approved. If this is not possible, the applicant is notified of deficiencies by the Graduate School. Once approved, the application is forwarded to the appropriate graduate program. Registration must be maintained for the entire quarter in which application for the degree is made. If a student should withdraw during the quarter, the application becomes void and a new one must be submitted at the appropriate time.

Master's degree applications are valid for two consecutive quarters, and if requirements for the degree are not completed during the quarter of the initial application, the student's application may be retained by the graduate program coordinator for the quarter immediately following (e.g., autumn to winter, winter to spring, spring to summer, summer to autumn) and returned to the Graduate School by the end of the second quarter. Thereafter, the application is void and the student must file a new application for the degree in the Graduate School during the first two weeks of the quarter in which work for the degree is to be completed.

Upon completion of departmental requirements, the master's degree application is signed by the Supervisory Committee and returned to the Graduate School. It must be received by the last day of the quarter if the degree is to be conferred that quarter. If all requirements are completed after this deadline, registration for the following quarter is required.

The student and the graduate program coordinator should be thoroughly acquainted with the requirements for the particular degree.

Master of Arts for Teachers

Master's degree programs for experienced teachers, which focus upon the fields of knowledge normally taught in the common school and the community college, have been established at the University. These programs provide alternatives to the research-oriented Master of Arts and Master of Science degree programs, which emphasize particular fields of knowledge. Programs leading to the M.A.T. degree are offered in Biology Teaching and English.

Doctoral Degree

The doctoral degree is by nature and tradition the highest certificate of membership in the academic community. As such, it is meant to indicate the presence of superior qualities of mind and intellectual interests and of high attainments in a chosen field. It is not conferred merely as a certificate to a prescribed course of study and research, no matter how long or how faithfully pursued. All requirements and regulations leading to the doctoral degree are devices whereby the student may demonstrate present capacities and future promise for scholarly work.

Summary of Requirements

In order to qualify for the doctoral degree, it is the responsibility of the student to meet the following Graduate School minimum requirements:

1. Completion of a program of study and research as planned by the graduate program coordinator in the student's major department or college and the Supervisory Committee. Half of the total program, including dissertation credits, must be in courses numbered 500 and above. At least 18 credits of course work at the 500 level and above must be completed prior to scheduling the General Examination.
2. Presentation of a minimum of three years (nine full-time quarters) of resident study, two of them being at the UW with at least one year in continuous full-time residence. (See detailed information under Residence). The continuous year may be satisfied by completing three full-time quarters out of any four consecutive quarters at the UW and must be completed prior to the General Examination. Residence requirement for the doctoral degree cannot be met solely by part-time study. A minimum of two academic years of resident study must be completed prior to scheduling the General Examination.
3. Numerical grades must be received in at least 18 quarter credits of course work taken at the UW prior to scheduling the General Examination. The Graduate

School accepts numerical grades in approved 400-level courses accepted as part of the major, and in all 500-level courses. A minimum cumulative GPA of 3.00 is required for a graduate degree at the University.

4. Creditable passage of the General Examination. Registration as a graduate student is required the quarter the exam is taken and candidacy is conferred.

5. Preparation of and acceptance by the Dean of the Graduate School of a dissertation that is a significant contribution to knowledge and clearly indicates training in research. Credit for the dissertation ordinarily should be at least one-third of the total credit. *The Candidate must register for a minimum of 27 credits of dissertation over a period of at least three quarters.* At least one quarter must come after the student passes the General Examination. With the exception of summer, students are limited to a maximum of 9 credits per quarter of dissertation (800).

6. Creditable passage of a Final Examination, which is usually devoted to the defense of the dissertation and the field with which it is concerned. The General and Final Examinations cannot be scheduled during the same quarter. Registration as a graduate student is required the quarter the exam is taken and the degree is conferred.

7. Completion of all work for the doctoral degree within ten years. This includes quarters spent On-Leave or out of status as well as applicable work from the master's degree from the UW or a master's degree from another institution, if applied toward one year of resident study other than the continuous full-time year of study.

8. Registration maintained as a full- or part-time graduate student at the University for the quarter in which the degree is conferred (see detailed information under Final Quarter Registration).

9. *A student must satisfy the requirements that are in force at the time the degree is to be awarded.*

Appointment of Doctoral Supervisory Committee

A *Supervisory Committee* is appointed by the Dean of the Graduate School to guide and assist a graduate student working toward an advanced degree and is expected to evaluate the student's performance throughout the program. The Supervisory Committee must be appointed no later than four months prior to the General Examination. Appointment of the Supervisory Committee indicates that the Graduate Faculty in the student's field finds the student's background and achievement a sufficient basis for admission into a program of doctoral study and research. "Preliminary" examinations, if required, should be completed prior to the request for appointment of the Supervisory Committee. If "preliminary" examinations are not an academic unit's requirement, it is appropriate to request appointment of the Supervisory Committee during the student's first year of study (see Graduate School Memorandum No. 13, Supervisory Committees for Graduate Students).

Admission to Candidacy for Doctoral Degree

At the end of two years of graduate study, the chair of the Supervisory Committee may present to the Dean of the Graduate School, for approval, a warrant permitting the student to take the General Examination for admission to candidacy for the doctoral degree. This means that, in the opinion of the committee, the student's background of study and preparation is sufficient to justify the undertaking of the examination. The warrant is approved by the Dean of the Graduate School only after the prescribed requirements of residence and study have been met and any specified language requirement has been fulfilled. The warrant must be received at least three weeks prior to the proposed

examination date. Written and other examinations prior to the oral are the responsibility of the graduate program and do not need Graduate School approval. During the oral examination, the chair, the Graduate School representative, and at least two additional examining committee members must be present. Registration as a graduate student is required the quarter the exam is taken and candidacy is conferred.

If the student's performance is judged by the Supervisory Committee to be satisfactory, the signed warrant certifying successful completion of the General Examination is filed in the Graduate School. If the General Examination is unsatisfactory, the Supervisory Committee may recommend that the Dean of the Graduate School permit up to a maximum of two additional reexaminations, after a further period of study. Any members of the committee who do not agree with the majority opinion are encouraged to submit a minority report to the Dean of the Graduate School.

Thereafter, the student is identified and designated as a *Candidate* for the appropriate doctoral degree and is awarded the Candidate's certificate. After achieving Candidate status, the student ordinarily devotes his or her time primarily to the completion of research, writing of the dissertation, and preparation for the Final Examination.

The Candidate certificate and the doctoral degree may not be awarded the same quarter.

Candidate's Certificate

The Candidate's certificate gives formal recognition of the successful completion of a very significant step toward the doctoral degrees awarded through the Graduate School: Doctor of Philosophy, Doctor of Education, and Doctor of Musical Arts. Students who have passed the Graduate School General Examination and who have completed all requirements for the degree except the dissertation and the Final Examination are awarded the Candidate certificate.

Dissertation and Final Examination

The Candidate must present a dissertation demonstrating original and independent investigation and achievement. The dissertation should reflect not only mastery of research techniques but also ability to select an important problem for investigation and to deal with it competently. Normally the dissertation is written in the English language. However, if there are circumstances that warrant the dissertation be written in a foreign language, approval must be received from the Dean of the Graduate School. The Graduate School publishes a booklet, *Style and Policy Manual for Theses and Dissertations*, which outlines format requirements. This manual should be obtained from the Graduate School and read thoroughly before the student begins writing the dissertation. The dissertation must meet all format requirements before being accepted by the Graduate School. Thesis advisers are available in the Graduate School, and students are encouraged to consult with them throughout the dissertation preparation process.

When the Supervisory Committee agrees that the doctoral Candidate is prepared to take the Final Examination, the Dean of the Graduate School should be informed of the decision and asked to designate a Reading Committee from among the members of the Supervisory Committee.

Once the Reading Committee is established officially with the Graduate School, a Request for Final Examination (signed by the Supervisory Committee chair and the members of the Reading Committee) is presented to the Graduate School three weeks prior to the Final Examination date, and if the Candidate has met all other requirements, a warrant authorizing the Final Examination is issued by the Graduate School.

The Reading Committee prepares a report briefly summarizing the distinctive achievements of the research, the methods used, and the results. One copy of the report with the original signatures of the Reading Committee must be submitted to the Graduate School after the Final Examination.

If the Final Examination is satisfactory, the Supervisory Committee signs the warrant and returns it to the Graduate School by the last day of the quarter in which the degree requirements are completed. Any members of the committee who do not agree with the majority opinion are encouraged to submit a minority report to the Dean of the Graduate School. If the examination is unsatisfactory, the Supervisory Committee may recommend that the Dean of the Graduate School permit a second examination after a period of additional study.

After the Final Examination, the doctoral Candidate has 60 days in which to submit the dissertation to the Graduate School. Registration as a graduate student is required the quarter the dissertation is submitted and the degree is conferred.

Publication of Doctoral Dissertations

Part of the obligation of research is publication of the results, and in the case of doctoral research, this means microfilm publication of the dissertation and/or abstract. This is a Graduate School requirement in addition to any previous or planned publication of any or all of the dissertation and provides worldwide distribution of the work. The Candidate signs the publication agreement when the dissertation is presented to the Graduate School. Publication in microfilm does not preclude other forms of publication.

The following fees for microfilming the doctoral dissertation are paid at the Cashier's Office, 129 Schmitz (all fees are subject to change): microfilming the entire dissertation, \$52; optional copyright fee (applicable only when the entire dissertation is microfilmed), \$35; or microfilming of only the abstract, \$50. These fees are in addition to the \$25 binding fee.

Special Individual Ph.D. Program

The Graduate School maintains the Special Individual Ph.D. (SIPh.D.) Program for exceptionally able students whose objectives for study are of an interdisciplinary nature that cannot be met within one of the University units authorized to grant the Ph.D. degree. The program is intended for dissertation topics that require supervision from two or more of the disciplines in which the University offers the Ph.D. degree. It is not intended as a mechanism for offering the Ph.D. degree within units that do not have their authorized own Ph.D. programs.

A graduate student may apply to the SIPh.D. Program when he or she has completed the master's degree, or has been admitted to the Graduate School and has completed at least three quarters of full-time work at the UW, and has carefully planned an appropriate program of studies.

Proposals, including GRE scores, are due by December 15 of each year, and decisions on admission are made by May 15 of the following year. Graduate School Memorandum No. 25, Special Individual Ph.D. Programs (revised August, 1994), contains additional information, proposal forms, and instructions and may be obtained from the Graduate School.

Special Programs and Facilities

Graduate School Support for Interdisciplinary Units and Graduate Student Recruitment

The objective of the *Graduate School Fund* (GSF) is to support the overall goals of graduate education through funding in the following areas: (1) program support for interdisciplinary units on campus, (2) graduate student recruitment support to all Ph.D.-degree granting units on campus, (3) honoraria and colloquia support for the dissemination of research, (4) graduate student travel to present their research at professional meetings, and (5) book publication subsidies for faculty.

GSF revenues come from various sources including, but not limited to: (1) state funds provided in the University's biennial budget, (2) private donations, (3) institutional allowances provided with fellowships and traineeships, (4) patent, invention, and copyright royalties accruing to the University, and (5) various special, short-term and renewable awards from the Provost's Office for maintenance of certain unique needs; e.g., tuition short-falls.

GSF policies and procedures are available from the Graduate School, 213 Gerberding, Box 351240, telephone 685-2628.

Related to its primary responsibilities for graduate education, the Graduate School has responsibility for the following programs:

Special Professorships and Lectureships

The *Walker-Ames Fund* was established in the 1930s through a bequest from the estates of Maud Walker Ames and her husband, Edwin Gardner Ames. Its stated purpose is to enable the University of Washington "to guarantee to the state of Washington the scholarly and educational services of the most distinguished minds available in this and other countries."

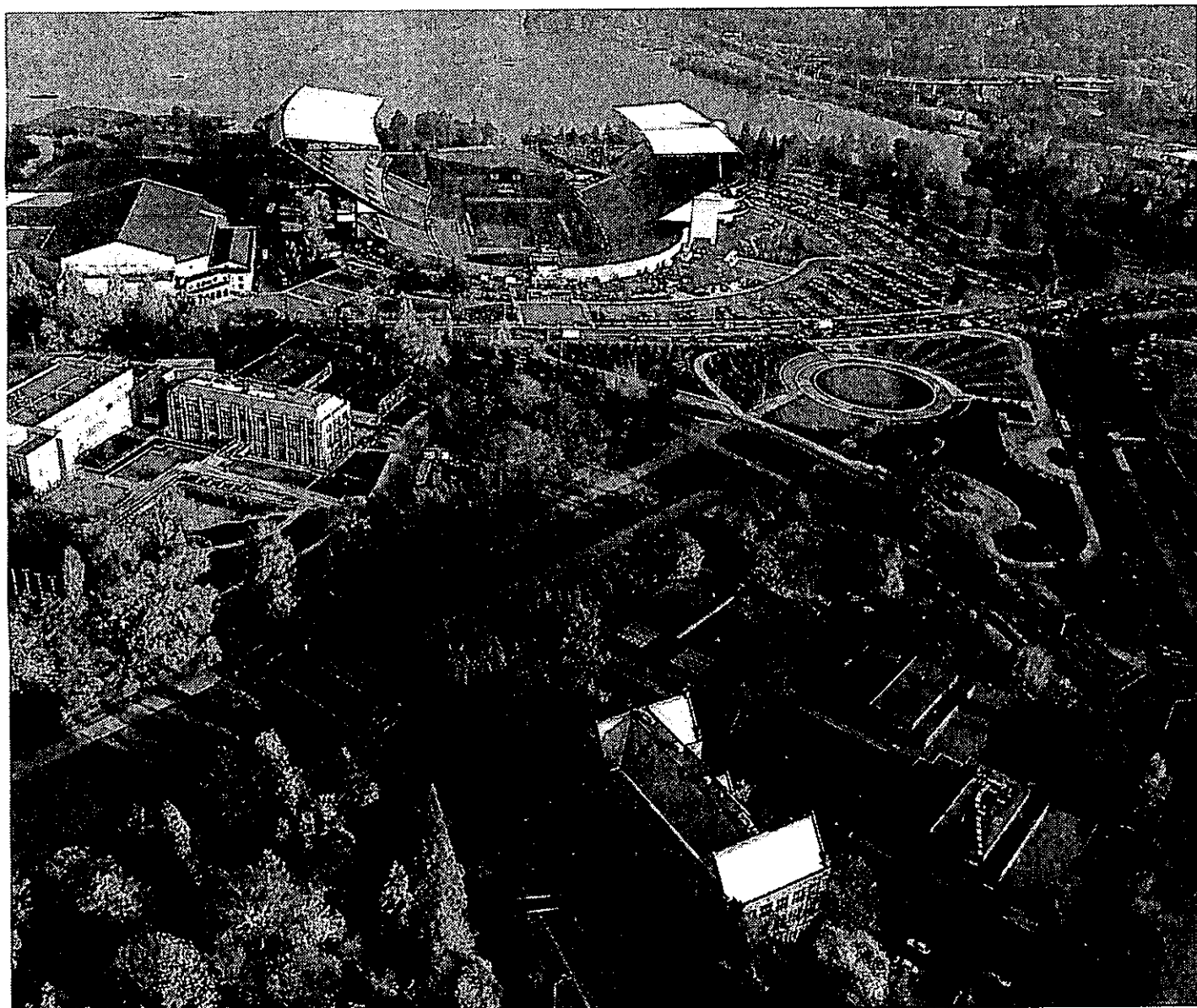
Chaired by the Dean of the Graduate School, a committee of University faculty members considers nominations from their colleagues and makes recommendations to the President for the appointment to Walker-Ames Professorships of distinguished scholars of national and international reputation.

Since 1936, when the first Walker-Ames Visiting Professor was appointed, over 300 scholars and members of the professions have come to the University as temporary members of the faculty, enriching the intellectual life of the University community and the state.

The *Jessie and John Danz Fund* was established in 1961 by a gift and bequest from John Danz; an additional gift was made to the Danz fund in 1969 by his wife, Jessie Mohr Danz. The Danz fund is intended primarily to enable the University to bring to the campus each year two "distinguished scholars of national and international reputation who have concerned themselves with the impact of science and philosophy on man's perception of a rational universe."

Nominations and appointments for the Danz lectureships are made in the same manner as the Walker-Ames professorships. Since 1961 when the lectureship was established there have been 82 appointed lectureships. Other arrangements compatible with the Danz bequest (e.g., the publicizing of the Danz Lectures) may be made upon approval of the committees involved.

Questions pertaining to the Walker-Ames Fund and the Jessie and John Danz Fund may be directed to the Dean of the Graduate School.



In addition to regular academic offerings, the University maintains a wide range of programs and facilities that provide special opportunities for graduate study and research. The following units are administered by the Graduate School:

Center for Law and Justice

Joseph G. Weis, Director
117 and 119 Savary, Box 353340

The Center for Law and Justice is a multidisciplinary research center established in 1975. Its goals are to engage in research, to contribute to the education and training of students, to offer consultation, and to provide liaison to the community in the areas of law and justice. To achieve these goals the Center: (1) apprises faculty members of research opportunities and assists in the development of proposals, (2) involves students from different disciplines in research training and education and sponsors biweekly colloquia, and (3) provides consultation to the criminal justice system and responds to the broader informational needs of the community.

University of Washington Press

Donald R. Ellegood, Director
1326 Fifth Avenue, Suite 555, Box 359120

The University of Washington Press, the book-publishing division of the University, has over a thousand titles in print, with special emphasis on art, anthropology, Asian-American studies, Asian studies, environmental studies, ethnology, history, literary criticism and linguistics, international studies, and regional subjects. The Press publishes about 50 new books each year, including reprints and imports. Authors include both members of the University faculty and scholars outside the University. Nonbook publications include diagnostic tests and audiovisual materials. In addition to its own publishing program, the Press distributes art books and catalogues for numerous museums.

Vice Provost for Research

Alvin L. Kwiram

Assistant Provost for Research

Donald R. Baldwin

Associate Vice Provost for Research

George D. Nelson

Director, Grant & Contract Services

Donald W. Allen

Associate Vice Provost for Research and Director, Office of Technology Transfer

Robert C. Miller

The Office of Research provides a range of services in support of scholarly and scientific inquiry at the University of Washington. The Vice Provost for Research works with faculty to establish appropriate research policies, develop research-related initiatives, increase resources available for research, and guarantee that the successes of faculty and the public benefits of research programs are widely known and understood. The Office of Research cooperates with the Graduate School and other units within the University that depend on or are affected by the research and graduate education activities of UW faculty. The Office of Research also serves as a point of contact with the public and private sectors on issues relating to research, the transfer of research discoveries, and the University's role in economic development. The two main service organizations within the Office of Research are the Office of Grant and Contract Services and the Office of Technology Transfer.

The Office of Grant and Contract Services (GCS) reviews and approves all proposals to outside agencies for support of UW research. The Director of GCS is responsible for negotiating the terms and conditions for grants and contracts in consultation with the principal investigator and appropriate UW administrators. All grant and contract awards received by the University are communicated to GCS which tracks the UW's cumulative funding totals. GCS is also responsible, through its Human Subjects Division, for managing the human subjects review process at the University in cooperation with University's Human Subjects Review Committees.

The Office of Technology Transfer (OTT) works with UW faculty, staff, and students to identify commercially viable research discoveries. OTT seeks legal protection for inventions through patenting and other means and negotiates contracts with companies interested in developing UW intellectual property. The revenues derived from OTT's activities are channeled back to the inventors, the UW units where the discovery originated, and the centrally administered Royalty Research Fund which supports UW research on a campus-wide basis.

Funding for UW Research

External Support for Research and Training is fundamental to the UW's established role as one of the nation's leading research institutions. During the past several years, the University has received more than \$400 million annually in grant and contract support for a wide array of research and training programs. Since the late 1960s, the University has ranked among the top five institutions in the United States in the receipt of federal research awards. About 80 percent of the University's grant and contract funds comes from federal agencies, most of the remainder coming from foundations, industry, and other private sources. These funds are awarded in response to faculty-initiated, University-approved proposals for funds to sup-

port specific projects in accord with the University's research, education, and public service goals. Grant and contract funding, which is received in addition to legislative appropriations for the basic operation of the University, funds about 5,400 FTE employees and provides significant opportunities for graduate students who work with faculty members in the conduct of research as a vital component of graduate education.

In addition to federal research funding, corporations provide an increasing amount of funding for research. Currently the UW receives about \$30 million per year in corporate research awards, and this amount is expected to grow as University-Industry collaborations continue to expand. Private gifts to the University total more than \$60 million per year and also add significantly to the opportunities of students and faculty to pursue research interests.

Internal Support for Research at the UW is based in part on the principle of directing revenue that arises from UW research discoveries back into the University's research enterprises. The Office of Research administers the Royalty Research Fund (RRF), which is derived from the UW's central share of royalty and licensing income negotiated by OTT and the Washington Research Foundation with companies that commercialize University technologies. The goal of the RRF is to stimulate additional scholarly initiatives, to encourage faculty to explore new directions in research and scholarship, and to improve the environment for intellectual endeavors at the University. Pro-

posals must demonstrate a high probability of generating important new scholarly materials or resources, significant data or information, or essential instrumentation resources that are likely to lead to external funding or that might lead to a new technology. The RRF guidelines, procedures, and application forms are available from the Office of Research.

Special Facilities

In support of scholarship, research activities, and regular academic offerings, the University maintains a wide range of special facilities that provide unique educational opportunities. The following list is illustrative of the range and diversity of special facilities at the UW.

Academic Computer Center

Provides instructional and research computing services for the University.

Applied Physics Laboratory

A research and development organization within the College of Ocean and Fishery Sciences, APL is one of four university research centers in the United States affiliated with the U.S. Navy. APL conducts a program of fundamental research, technology development, engineering, and education, emphasizing naval applications of ocean and polar science, acoustics, and



engineering. APL has a \$30 million per year research and development budget and employs approximately 250 staff members, including 145 scientists and engineers (26 with faculty appointments) who conduct research for the Navy, NSF, NASA, NOAA, ARPA, and other federal agencies.

Burke Memorial Washington State Museum

An educational and cultural center whose function is to collect, preserve, research, exhibit, and interpret the natural and cultural objects of the human environment, particularly the Pacific Ocean, its islands, and mainland shores.

Henry Art Gallery

The art museum of the University of Washington.

Friday Harbor Laboratories

The Friday Harbor Laboratories facility is the principal marine science field station of the University of Washington. Its faculty is drawn from various academic units of the University, including botany, fisheries, oceanography, and zoology, as well as visiting faculty members from many other U.S. and foreign institutions.

The Laboratories, located approximately 80 miles north of Seattle near the town of Friday Harbor on San Juan Island, offers a biological preserve of nearly 500 acres of wooded land with about two miles of shoreline. The island is one of the largest of the 172 that make up the San Juan Archipelago, located in the northwest section of the state of Washington between Vancouver Island and the United States mainland. In addition to the Friday Harbor site, the Laboratories' administration has the responsibility for overseeing biological preserves leased or owned by the University on San Juan Island (False Bay and Argyle Lagoon), Shaw Island (uplands adjacent to Point George and Parks Bay; Cedar Rock Biological Preserve), and Lopez Island (Point Colville and Iceberg Point). Goose and Deadman islands, biological preserves owned by the Nature Conservancy, are also under the stewardship of the Laboratories.

The Laboratories are close to seawaters that range from oceanic to those highly diluted by streams, some with depths to 1,000 feet, others with bottoms varying from mud to rock, and water movements ranging from those of quiet bays and lagoons to those of swift tideways. The waters about the San Juan Archipelago abound in varied marine flora and fauna.

The Laboratories offer opportunities for independent and supervised research, as well as a varied program of instruction for graduate and undergraduate students. Throughout the year, use of the Laboratories' facilities for research in various areas of marine science is encouraged.

Nuclear Magnetic Resonance Facility

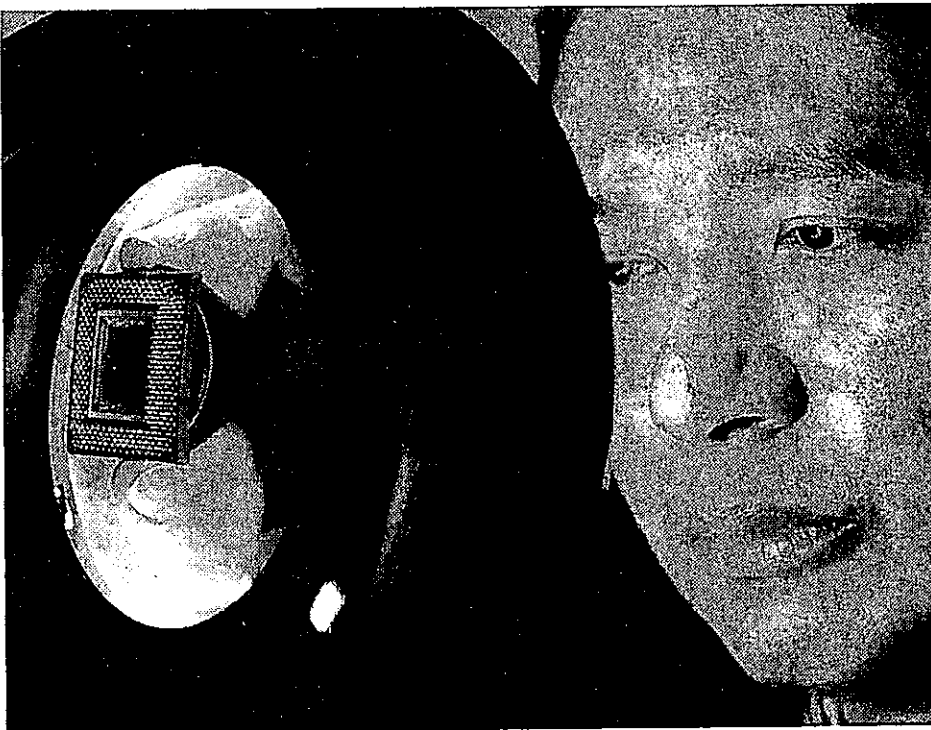
The UW has one of the most advanced facilities for Nuclear Magnetic Resonance (NMR) using high field superconductivity magnets capable of investigating biomolecules, macromolecules, and solid state samples at frequencies of 500 MHz for protons. A new state-of-the-art 750 MHz spectrometer was installed at the end of 1995.

Nuclear Physics Laboratory

Houses a Van de Graaff accelerator and a cyclotron for research in physics, chemistry, cancer therapy, nuclear medicine, radiation biology, and related fields.

Oceanographic Research Vessels

Operated for field study and research in Puget Sound and the Pacific Ocean.



Speech and Hearing Clinic

Serves as a center for research in speech science, speech and language pathology, and audiology, and provides services to the public.

University of Washington Medical Center/Harborview Medical Center

The University operates two major teaching hospitals: its own 450-bed University of Washington Medical Center and, under contract with King County, the 413-bed Harborview Medical Center.

University Libraries

With more than five million volumes, an equal number of microforms, several million items in other formats, and more than 50,000 serial titles, the University of Washington Libraries houses one of the top research collections in the country and form a part of one of the most innovative electronic campus information networks in the world. The fully integrated, computerized UW Libraries Catalog provides bibliographic information and circulation status for the cataloged holdings of the Libraries. The UW Libraries Catalog and an increasing number of other databases (ERIC, MEDLINE, INSPEC, PsychINFO, MLA Bibliography, etc.) may be searched by author, title, subject, publisher, keyword, and various numbers, including call number, International Standard Book Number (ISBN), International Standard Serial Number (ISSN), and Superintendent of Documents Number. Publication date and date ranges are among the limit options available. These databases are available through a multiple-window, graphical interface (Willow) or a text-based interface (Wilco).

The UW Libraries maintains an active homepage on the World Wide Web. A full description of the library system, its services and resources, along with unique databases, graphics, annotated bibliographies and other resources developed by library subject specialists, are all available at <http://www.lib.washington.edu/>

The Libraries offers a broad array of online databases and CD-ROM products directly available to library users. An increasing number of these bibliographic

and fulltext resources are available on the UW Campus Network via UWIN and Wilco (accessible from terminals in the Libraries and from campus uniform access accounts) or on local area networks located in public service units and branches. For more information concerning electronic databases, call Reference and Research Services, 543-0242, or consult the Libraries homepage at <http://www.lib.washington.edu/>.

The Libraries also offer an extensive array of services in each of its 22 units. The Suzzallo and Allen Libraries, the Odegaard Undergraduate Library, the Health Sciences Library and Information Center, the East Asia Library, and the 15 branch libraries each provide reference services and offer instruction in the use of library resources.

X-Ray Beamline Facility

Located at the Advanced Photon Source of the Argonne National Laboratory in Argonne, Illinois, this facility is operated by a Pacific Northwest consortium which the UW leads. It enables the investigation of the properties of x-rays and their interaction with matter. The Advanced Photon Source uses synchrotron radiation to provide the most brilliant source of x-rays currently available. It is anticipated that instrumentation will be operational by 1997 to fully utilize this remarkable resource.

Centers, Institutes, and Other Research Organizations

Nearly a hundred centers, institutes and other organizations operate at the UW in support of faculty research activity. In many cases, centers and institutes are created to facilitate interdisciplinary research or to coordinate research involving many participants, some from outside the UW community. Additional information about the organizations listed below is available in *Centers and Research Organizations*, a booklet available from the Office of Research.

Addictive Behaviors Research Center
Aerospace & Energetics Research Program
Alcohol and Drug Abuse Institute

Alzheimer's Disease Research Center
Arrhythmia Service
Bone and Joint Center
Center for AIDS and STD
Center for AIDS Research
Center for Educational Renewal
Center for Effective Schools
Center for Health Promotion in Older Adults
Center for the Humanities
Center for Imaging Systems Optimization (CISO)
Center for Instructional Development and Research (CIDR)
Center for International Business Education and Research (CIBER)
Center for International Trade in Forest Products (CINTRAFOR)
Center for Law and Justice
Center for Law Science and Technology
Center for Quantitative Science in Forestry Fisheries and Wildlife
Center for Social Science Computation and Research
Center for Spatial Statistics
Center for Streamside Studies
Center for Studies in Demography and Ecology
Center for Studies in Social Psychology
Center for the Care of Older Adults
Center for the Study and Teaching of At-Risk Students
Center for the Study of the Pacific Northwest
Center for Urban Horticulture
Center for Urban Water Resources Management
Center for Vascular Biology
Center for Women's Health Research
Center on Human Development and Disability
Clinical Nutrition Research Unit
Diabetes Endocrinology Research Center
Diagnostic Imaging Sciences Center
Fisheries Research Institute
Fred Hutchinson Cancer Research Center
Friday Harbor Laboratories
General Clinical Research Center
Halbert Robinson Center for the Study of Capable Youth
Harborview Injury Prevention and Research Center
Health Policy Analysis Program
Institute for Economic Research

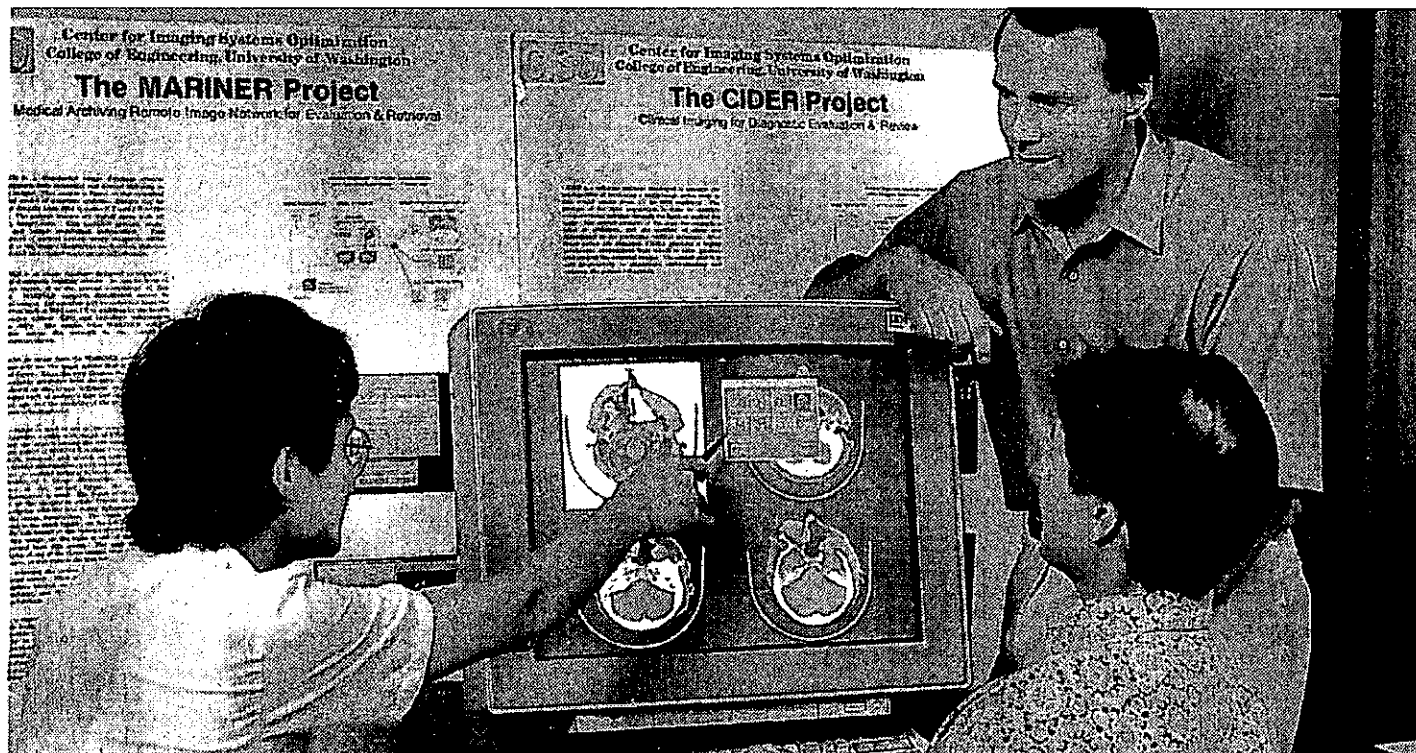
Institute for Environmental Studies
Institute for Ethnic Studies in the United States
Institute for Food Science and Technology
Institute for Nuclear Theory
Institute for Public Policy and Management
Institute for the Study of Educational Policy
Joint Institute for Study of Atmosphere and Ocean (JISAO)
Markey Molecular Medicine Center
Metabolism and Cystic Fibrosis
Middle East Center
Multidisciplinary Pain Center
National ESCA and Surface Analysis Center for Biomedical Problems
National Park Service Cooperative Park Studies Unit
National Resource Center in International Studies
National Science Foundation Industry - University Cooperative Research Center for Design of Analog-Digital Integrated Circuits (CDADIC)
National Science Foundation Industry - University Cooperative Research Center for Process Analytical Chemistry (CPAC)
National Simulation Resource Facility in Circulatory Mass Transport and Exchange
Northwest Center for Research on Women
Northwest Lipid Research Laboratories
Northwest Regional Spinal Cord Injury System
Olympic Natural Resources Center
Pacific Rim Education Program
Pharmacoeconomics and Drug Policy Program
Polar Science Center
Population Center for Research in Reproduction
Puget Sound Blood Center
Quaternary Research Center
Regional Epilepsy Center
Regional Primate Research Center at the University of Washington
Research and Training Center on Traumatic Brain Injury
Research Center in Oral Biology
Resource Facility for Kinetic Analysis
Robert Wood Johnson Clinical Scholars Program
School Law Division
SCOR in Coronary and Vascular Diseases
Sexually Transmitted Diseases Cooperative Research Center

South Asian Studies Program/South Asia National Resource Center
Southeast Asian Studies Program
Transportation Northwest (TransNow)
Treaty Research Center
University of Washington Center for the Humanities
Virginia Merrill Bloedel Hearing Research Center
W.M. Keck Center for Advanced Studies in Neural Signaling
WAMI Rural Health Research Center
Warren G. Magnuson Institute for Biomedical Research and Health Professions Training
Washington Cooperative Fish and Wildlife Research Unit
Washington Sea Grant Program
Washington State Transportation Center (TRAC)
Western Regional Aquaculture Consortium

Field Stations

Field work is an essential component of research and instructional programs in many academic disciplines, and access to appropriate field sites is vital and necessary for research universities. Detailed information about each of the University's research sites is available in *University of Washington Field Stations*, an inventory available from the Office of Research. The following list of 26 sites represents a broad spectrum of types and locations.

Apache Point Observatory, Archaeology Field Station, Big Beef Creek, Blue Glacier, Calkins Aircraft Hangar, Cheeka Peak Atmospheric Research Station, Chignik Lake, Clifford A. Barnes Research Vessel, Energy Test Homes, Friday Harbor Laboratories, Joe E. Monahan Findlay Lake Preserve, Lake Ilamna and Porcupine Island, Lee Forest, Manastash Ridge Observatory, Olympic Natural Resources Center, Organization for Tropical Studies, Pack Forest, Regional Primate Research Center, Rome Center, Seismic Network, Seward Park Hatchery, Thomas G. Thompson Research Vessel, Thompson Research Site, Urban Horticulture Ecological Research Area, Washington Park Arboretum, Westport House, Wood River System.



The Impact of UW Research

Research programs at the UW benefit students, the state, and the nation. Over the last decade, these programs have produced life-saving advances in medical technology, support for key state and regional industries, research and analysis on critical public policy issues, patented technologies, training for more than 8,000 graduate and professional students each year, as well as contributions to scholarly literature in virtually all major fields of the arts, sciences and humanities. The following sections contain brief descriptions of a few of the many interesting research projects currently underway at the UW.

Earth, Ocean, and Atmospheric Sciences

UW earth scientists have a long tradition of concentrating on regional studies to learn more about the forces that continue to shape the Pacific Northwest. Recent evidence now suggests that great earthquakes of magnitude 7 or 8 have occurred in the Pacific Northwest in the not-to-distant past, and are likely to recur at some time in the future. Data gathered from a network of seismic stations throughout the Pacific Northwest are permitting new faults in the region to be mapped and characterized. The first three-dimensional images of structures within the earth in this region are being generated. Lessons learned from seismic studies since the eruption of Mount St. Helens are being applied to eruptive activity around the globe, from Alaska to Mount Pinatubo in the Philippines. Additionally, extreme conditions deep inside the earth are simulated in the UW High Pressure Mineral Physics Lab in order to understand the geologic processes that shape our planet.

New underwater observing platforms are being installed to monitor volcanic activity on the sea floor more than a mile and a half below the surface of the Pacific Ocean off the coast of Washington State. These under-sea volcanoes and hydrothermal vents spew out heated, mineral-laden waters that nourish exotic life forms and form rich metal deposits. The heat-loving organisms, capable of existing without light from the sun, may be among the most ancient forms of life on earth.

UW scientists have long been interested in polar research, including both the Arctic and the Antarctic. The University is one of the major centers in the world for studies of ocean currents, ice formation, ice movement, and air-sea-ice interaction in these regions. UW personnel have developed unusual expertise for operating in polar regions. Through the Applied Physics Laboratory, UW investigators regularly conduct studies from bases sited on Arctic pack ice and have deployed a series of weather buoys on the ice and in Arctic waters that form part of a worldwide weather-forecasting system.

An ice core containing an unprecedented record of climate conditions in a near-coastal area of Antarctica has been obtained by scientists in the UW Quaternary Research Center. The ice sample, which goes back 140,000 years through a complete ice age cycle, was taken at Taylor Dome, the site of major changes in glacier cover that affected sea level at the end of the last ice age.

Work by UW atmospheric scientists has established the role of sulfate aerosol in global climate change. Other studies are shedding light on past and future El Niño weather events—intervals of especially warm ocean temperature that periodically appear around December in the equatorial Pacific and that disrupt weather patterns around the globe. UW researchers have developed a theoretical understanding of the mechanisms that give rise to the El Niño phenomenon. Cores obtained from coral formations in the Pacific provide a record of past El Niño events and may lead to

more accurate forecasts of these weather changes in the future.

UW atmospheric scientists have pioneered the study of clouds and weather systems by flying into the heart of storms approaching the Washington coast. Using one of the best-equipped research airplanes in the country, they have developed techniques for examining the structure of these storms in detail. Their expanding base of knowledge, coupled with advanced computer modeling and prediction tools, is producing weather forecasts with greater precision than previously possible.

A unique scientific resource exists in the UW's Friday Harbor Laboratories. Located on one of the larger islands of the San Juan Archipelago, the Laboratories draw researchers from all over the world, who use the pristine Puget Sound water pumped into the laboratories for sensitive studies of reproduction, physiology, and development of marine life.

The School of Fisheries, renowned for the Donaldson salmon as well as for its contributions to the High Seas Salmon Program and Alaska Salmon Program, also has made many important contributions to the development of shellfish aquaculture in Puget Sound and around the world. The triploid oyster, prized for its superior characteristics, was developed by UW fisheries researchers.

The Columbia River Salmon Passage model, or CRISP, is a computer model that relates the number of juvenile salmon that survive their journey through reservoirs and dams on the Columbia River to various parameters such as hatchery release dates, reservoir levels, and water flow rates. The model may help fishery biologists and planners to understand the complex implications of river management decisions.

Physical and Chemical Sciences

Extremely high precision measurements of atomic properties are the forte of a strong atomic physics group, which has brought recognition in the form of a Nobel Prize awarded to Professor Hans Dehmelt in 1989. Later that year, a Department of Energy competition for its first Nuclear Theory Institute was won by the University. Since that time, a distinguished staff and an international visitor program have made the University a center for research in fundamental nuclear physics and associated problems in astrophysics and particle physics.

One of four Department of Energy-supported nuclear physics laboratories located at American universities is found at the University. This laboratory is equipped with a superconducting booster to a tandem Van de Graaff accelerator, placing the nuclear physics research facility on a par with the best in the world in its energy range. The Particle Physics Group and the Visual Techniques Laboratory are engaged internationally in research at the frontiers of knowledge relating to high-energy particles created both in the laboratory and by nature.

The University has been a leader in the development and use of XAFS, a sophisticated x-ray tool for determining the structure of materials. Physicists studying condensed matter are engaged in the development of the Advanced Photon Source, a high energy x-ray source that will be the most intense in the world. With this source it will be possible to carry out detailed studies of topics such as the growth and structure of liquid crystal films; the structure on an atomic scale of proteins and new, specially-tailored drugs; and the structure of thin films, ranging from one atom thick to multiple-layered heterostructures with many layers of atoms.

Astronomers at the University conduct research in a wide variety of astronomical subjects, from the study of solar system bodies to the nature of the universe as a whole. The UW's Interplanetary Dust Laboratory has pioneered the discovery and study of cometary and asteroidal dust. The Stardust mission led by UW astronomer Don Brownlee will gather and return samples of interstellar dust from a comet called Wild-2 in January 2004. Stardust, which was selected by NASA as the fourth flight mission in its Discovery program, will be launched on an expendable launch vehicle in February 1999. The return capsule carrying the comet dust samples will parachute to Earth in January 2006.

The University is part of a consortium that has constructed a 3.5-meter optical telescope of innovative design. The facility is located at Apache Point in the high, clear New Mexico mountains. One of the largest university-operated telescopes in the country, it is accessed by faculty and students remotely from a laboratory in the new Astronomy-Physics Building on the UW campus.

UW astronomers have also used the Hubble Space Telescope to probe the secrets of stellar evolution, deriving a fresh understanding of the way that stars are



born, change, and die. Scientists explore the nature of galaxies and their mysterious content of "dark matter." Other studies range from the nature of cosmic black holes to mergers and violent collisions of galaxies, and quasar phenomena.

Basic research in the chemical sciences is aided by exceptional research tools. The Department of Chemistry is collaborating with Pacific Northwest National Laboratory, Richland, Washington in an effort to construct a 1,000-megahertz nuclear magnetic resonance (NMR) spectrometer which will provide an instrument of unprecedented power for probing molecular structure. The University has acquired state-of-the-art equipment for studies involving magnetic resonance imaging (MRI), used by health researchers studying complex biological processes.

The Center for Process Analytical Chemistry is a joint University/industry effort to develop novel sensors and instrumentation for continuous monitoring of chemical processes used in the manufacturing and environmental settings. Projects range from fiber optic sensors and spectrometric methods to data analysis and process control algorithms. Research results from the Center transferred to industrial sponsors have led, for example, to a commercial, online, near-infrared spectrometer for determining quality parameters of hydrocarbon fluids.

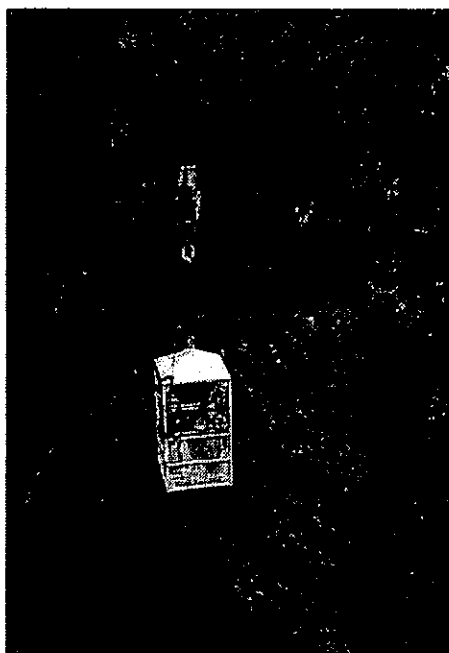
Engineering and Applied Sciences

A group of UW engineering researchers working in the field of biomimetics are taking their inspiration from nature in designing new materials. They are probing the secrets of such natural substances as slug mucus, spider webs, and abalone shells in order to produce man-made materials that are stronger, lighter, less expensive, and more environmentally benign to manufacture than conventional materials.

The Washington Technology Center (WTC) is a state resource, established in 1983 with funding from the combined Department of Community and Economic Development. It was created to encourage collaborative industry-university research and development in new and emerging technologies to benefit the economic vitality of the state of Washington. Current research areas include advanced materials and manufacturing, biotechnology, computer systems and software, microelectronics, and human interface technology. The WTC promotes faculty collaborations with industry within the state, and co-sponsors applied research at the state's research universities directed toward the needs and interests of state industries. Its state-wide headquarters are located in Fluke Hall at the UW.

The Center for Bioengineering is the home of pioneering work in diagnostic ultrasound, which enables physicians to image in detail the internal features of a patient without having to perform surgery. In addition, important strides continue to be made in understanding how to design man-made materials that are compatible with the human body.

Multidisciplinary research efforts relating to image processing—from picture archiving and communications systems and telemedicine to multimedia and computer graphics—are focused in the Department of Electrical Engineering. UW researchers are working with military and federal medical treatment facilities throughout the Puget Sound area to establish a telemedicine network, allowing physicians to be linked over a computer network and enabling them to share, analyze, and interact with medical data such as charts, x-rays, and other medical images. The heart of the telemedicine demonstration is the MediaStation 5000, an ultrafast, high-resolution multimedia computing system, which uses the Texas Instruments (TI) Multimedia Video Processor chip, developed by UW researchers in collaboration with TI.



The Department of Computer Science and Engineering is known for its catalytic role in bringing tools for designing microchips to engineers and industrial firms in the Pacific Northwest, and for its pioneering work to address critical safety issues in software systems. Recently, UW researchers have been recognized for work leading to a 3-dimensional photography system as well as for the development of Internet and World Wide Web searching tools, called software robots ("softbots").

The tremendous flexibility and power of Geographic Information Systems are being brought to bear on a wide range of research activities across the campus. In a fusion of GIS, computer-aided design, and virtual reality, efforts are underway to link GIS capabilities with visualization tools to allow users to display and move around in a virtual three-dimensional representation of a GIS database. For example, city planners may be able to use their GIS systems to navigate through a cityscape to visualize key features or to evaluate different planning options. This is the focus of the new Community and Environmental Design and Simulation Laboratory at the University, a partnership between the College of Architecture and Urban Planning and the Human Interface Technology (HIT) Lab of the WTC.

In another project at the HIT Lab, researchers are working on a process to display electronic images directly on the human retina. Researchers anticipate the retina display may replace computer screens and video monitors in the future.

Civil engineers are studying problems of air pollution and the technology to detect, analyze, and prevent it; problems of water pollution, acid rain, and lake restoration; methods of predicting the effects of earthquakes on man-made structures; transportation systems that take advantage of the latest computing and communications technologies, among other topics. Mechanical engineering research focuses in part on technology to improve product design and develop advanced automated manufacturing systems.

Biological Sciences

Research programs in the biological and zoological sciences take research teams to sites in the Pacific Northwest region and beyond, to remote corners of the world. Research in zoology has focused on the neurological basis of behavior and the origin of circadian rhythms, the physiology of insect development and the

role of hormones in metamorphosis, and the ecology of intertidal communities. Pioneering field studies of the male red-winged blackbird conducted by UW zoologists have helped to explain the phenomenon of territorial dominance in animals.

A multidisciplinary team of UW scientists has been intensely involved in the study of the recovery of life in the blast zone that resulted from the eruption of Mount St. Helens in 1980. Findings from that effort are changing how scientists understand and study the recovery of volcanic sites around the world.

Forest nutrition studies initiated decades ago by UW researchers have produced one of the largest databases in the world on the growth characteristics of Douglas fir and western hemlock, and spawned a highly successful research cooperative comprising over 35 organizations. Today, the Stand Management Cooperative integrates research in forest nutrition, silviculture, wood quality, and modeling.

UW microbiologists have pioneered genetic engineering techniques for plants. Recently, a UW group has applied the latest gene mapping techniques to the problem of how much genetic change is required in order for a new species to evolve, one of the central mysteries of evolutionary biology. Investigators from the College of Forest Resources, Biochemistry, and Botany have teamed up in this effort.

Researchers in the Department of Genetics in the College of Arts and Sciences have conducted basic research in yeast genetics that has led to a vaccine against Hepatitis B.

Health Sciences

Since its establishment many decades ago, the UW Health Sciences Center has become well known for its teaching, research, and patient care. University physicians and staff members pioneered the first successful long-term kidney dialysis techniques, which have led to lifesaving treatments for tens of thousands of people. Continuing research is leading to the production of simpler and more portable devices for patients suffering from kidney failure.

Medic One, a system of rapid response for victims of accidents and heart attacks, is based at Harborview Medical Center, one of the University's two teaching hospitals. It has provided a national model for emergency medical care.

University physicians have been leaders in the development of bone-marrow transplantation, which offers the hope of curing several forms of leukemia. E. Donnall Thomas, former head of medical oncology at the University, now professor emeritus, received the Nobel Prize in 1990 for developing bone marrow grafting techniques.

Fundamental research in biochemistry is unlocking the secrets of life processes at the molecular and cellular level. The discovery of protein phosphorylation—the reactions that regulate energy use, growth, and transformation of cells—by UW scientists Edmond Fischer and Edwin Krebs was recognized with the Nobel Prize for Medicine in 1992.

Building on work over the past three decades to understand the structures of ion channels in the cellular membrane, new efforts are directed toward the relationship between ion channel abnormalities and various diseases such as cystic fibrosis, certain bacterial infections, and forms of muscular dystrophy.

UW scientists have made important progress in understanding the causes of atherosclerosis; in understanding and isolating blood growth and blood clotting factors; and in studying the processes involved when white blood cells engulf and destroy bacteria. On another front, a UW team has developed a novel method to measure bone loss and to monitor the effectiveness of therapies to treat osteoporosis; the technology is being commercialized by a Seattle company.

THE OFFICE OF RESEARCH

A major effort in molecular biotechnology under the direction of Leroy Hood is helping to map the Human Genome. Hood played an instrumental role in launching and promoting the Human Genome Project, the 15-year, \$3-billion effort to map the roughly 100,000 genes that provide the blueprint for the human body. Recently completed was the sequence analysis of the beta T Cell receptor family. The work has yielded the longest stretch of human genetic sequence analyzed to date and is changing how scientists study human T Cell receptor genes.

A new center in ecogenetics explores the genetic basis for cellular responses to environmental insults or other stresses. Research programs at the UW in the study of heart disease, diabetes, and sexually transmitted diseases have achieved international recognition.

Genetic engineering techniques leading to the transgenic mouse and the use of transgenic animals in the study of new treatments for disease have been pioneered at the University.

The School of Pharmacy has a strong program in pharmacokinetics, the study of how drugs are metabolized and the rate at which they affect target organs and are eliminated by the body. Research is aimed at the analysis and prediction of dangerous drug interactions.

The University's Child Development and Mental Retardation Center is recognized for its pioneering work in the causes, prevention, and treatment of diseases and disorders leading to mental retardation.

The UW School of Dentistry is renowned for its work in periodontology, the study of infectious diseases of the tissues surrounding the teeth. The School has the largest clinical service in the world dedicated to the challenges of treating patients with dental fears and phobias. A UW dentistry team has developed the first diagnostic criteria for temporomandibular disorders—chronic pain in the ear, jaw, or muscles of the face, conditions which affect some 12 percent of the population. University faculty recently participated in a landmark survey of children's dental health in Washington State.

Social Sciences

Interactions among individuals and groups determine the texture of society. The study of these interactions is the province of social scientists, whose work ranges from basic research on perception to the effect of interest groups on public policy.

Nationwide attention has been given to the work of UW investigators studying couples and the common factors that underlie successful relationships. In related research, several investigators are examining the processes of interaction in small groups, from families to work teams.

Important research in leadership and motivation, in human memory, and in alcoholism and addictive behavior is being carried on in a number of academic disciplines. Alcoholism studies range from physiological experiments to model counseling programs for pregnant women to participant-observer studies of addictive behavior. The focus for this effort is the Alcohol and Drug Abuse Institute.

Social scientists have performed provocative studies on the changing role of urban neighborhood organiza-

tions. Another group has concentrated on deviant behavior, including juvenile delinquency and possible prevention strategies. Their work is part of a larger effort by faculty members and graduate students to explore the ways that society's institutions react to deviant behavior.

Anthropologists are studying the changes in fertility, medical history, and cultural adaptation of the Japanese-American community in the Pacific Northwest, and the challenges faced by immigrants from Vietnam and Laos. Other faculty members are pursuing problems in distant locales and times, such as the beginning of agriculture in the Nile Valley.

Geographers are studying regional issues, such as the economic linkages between the Pacific Northwest and other parts of the country, the design and financing of efficient and equitable transit systems, the recent surge in population of nonmetropolitan areas and its policy implications, and the geography of access to health care.

Economists continue working on models to predict the results of federal monetary and fiscal policy. A group of researchers is breaking ground in a relatively unexplored area, the economics of natural resources, comparing the costs and benefits of different patterns of usage. These investigations are designed to help policy makers evaluate alternatives.

Social scientists at the University have a special interest in international relations. The University has been a pioneer in research concerning the Near and Far East, and this important role was emphasized with the establishment of the School of International Studies in 1978 (now the Henry M. Jackson School of International Studies), the culmination of more than 60 years of scholarly activity in area studies and international relations. Scholars in political science, anthropology, sociology, and the humanities study the role of culture in international affairs. Economists and geographers study development, resource management, and international economics. Historians complement the work of social scientists in exploring the basis of current thought, and scholars in languages and literature provide essential knowledge of original texts and the relationship of language to culture.

Humanities and the Arts

Research in the humanities often fulfills a primary mission of humanistic study—the preservation of the literary and artistic achievements of mankind. One aspect of this research is textual scholarship, involving the identification and authentication of original texts and artifacts. New knowledge is also generated through reassessment of earlier texts and works of art.

Texts that form part of Egypt's Nag Hammadi Library, found more than a quarter of a century ago but only recently translated from Coptic, may lead to a reinterpretation of early Christianity. Located near the upper Nile, the library contains documents from little-known monastic groups, previously unknown Christian gospels, and both familiar and unfamiliar sayings of Jesus. A UW scholar studying these texts expects them to have as great an impact as the discovery of the Dead Sea Scrolls. The texts also will shed more light on the heretical Gnostic movement, which offers a radically different interpretation of Genesis.

A faculty member in the Department of English, working in the British Library, discovered several issues of a

previously unknown periodical written by Henry Fielding, the famous eighteenth-century novelist. He has prepared annotated facsimiles of the issues, which shed new light on aspects of Fielding's life, as well as adding some important material to the history of journalism.

Research often is meant to describe exclusively the generation of new knowledge, but in the humanities a growing number of faculty members explore the theoretical basis underlying our knowledge and the means of transmitting it. The focus for these studies has been a colloquium in theory involving faculty members and graduate students. Discussions on problems in the theory of narrative, for instance, may span literature, history, science, and psychoanalysis—in fact, wherever the written word is used. The colloquia have acted as catalysts for several scholarly articles and may lead to an expanded program encompassing other disciplines.

Theoretical studies also form an important component of research in the arts. Some faculty in the School of Music conduct extensive research in the scientific analysis of sound, known as systematic musicology. Studies in this field include the influence of vibrato on judgments of vocal blend; context and time in musical perception; and rhythmic responses of preschool children. Other faculty members are exploring new ways of creating music, including the use of computers.

The concept of scholarly achievement in the arts often is synonymous with performance or exhibition. The UW School of Music has on its faculty a number of nationally recognized composers, including two longtime recipients of research funds from the American Society of Composers, Authors, and Publishers (ASCAP). The awards are designed to encourage and assist writers of serious music. The School of Music also is home to one of the finest opera programs in the country.

The School of Art faculty includes nationally and internationally known artists and scholars in nearly every one of its ten studio, art history, and design disciplines. Studio artists carry on the age-old quest for aesthetic quality but also pursue stylistic innovation, as well as developing new techniques in such diverse areas as non-toxic water-soluble printing and computer-generated imagery. Many of the School's art historians have helped reshape this young discipline through their studies of art as cultural expression.

The UW School of Drama houses the famous Professional Actors' Training Program, which, besides teaching basic acting skills, provides an intensive introduction to the practice of the theater arts. The program attracts dedicated students who work for demanding, scrupulous visiting directors from the commercial stage as well as for permanent faculty members with extensive professional experience. Graduate research in the history and practice of theater forms an integral part of the School's diverse program.

The University's program in creative writing is one of the oldest in the country. It achieved prominence in the 1950s and 1960s, when its faculty included Theodore Roethke, winner of the Pulitzer Prize in 1953. The tradition of excellence continues, with current University poets and authors receiving critical acclaim throughout the nation, including the 1990 National Book Award for Fiction. This concentration of talent has made the University a center for literary activity in the Pacific Northwest.

UW Extension

Vice Provost, Office of Educational Outreach (UW Extension, Summer Quarter, Evening Degree, and Distance Learning)

Richard L. Lorenzen

Associate Vice Provost

David P. Szatmary

Established in 1912, UW Extension brings the University's resources to the community by providing access to quality educational programs which meet ongoing professional and personal needs.

This section describes the various programs currently part of UW Extension. The quarterly UW Extension catalog contains details of the program offerings. It is mailed without charge to residents of western Washington, who may receive it by telephoning (206) 543-2320 or by writing to UW Extension, Box 354224, Seattle, WA 98105-4190.

Evening Credit Program

Many credit courses are offered each quarter for those who are not formally admitted to the University. The classes are intended for non-traditional degree seekers as well as for postbaccalaureate individuals pursuing new skills and knowledge. All evening credit courses are taught by University faculty members and lecturers, approved by the appropriate academic units. UW credit is awarded and the grades earned are included in GPA calculations. Matriculated students enrolling in these courses pay course fees in addition to regular tuition.

Graduate Nonmatriculated Program

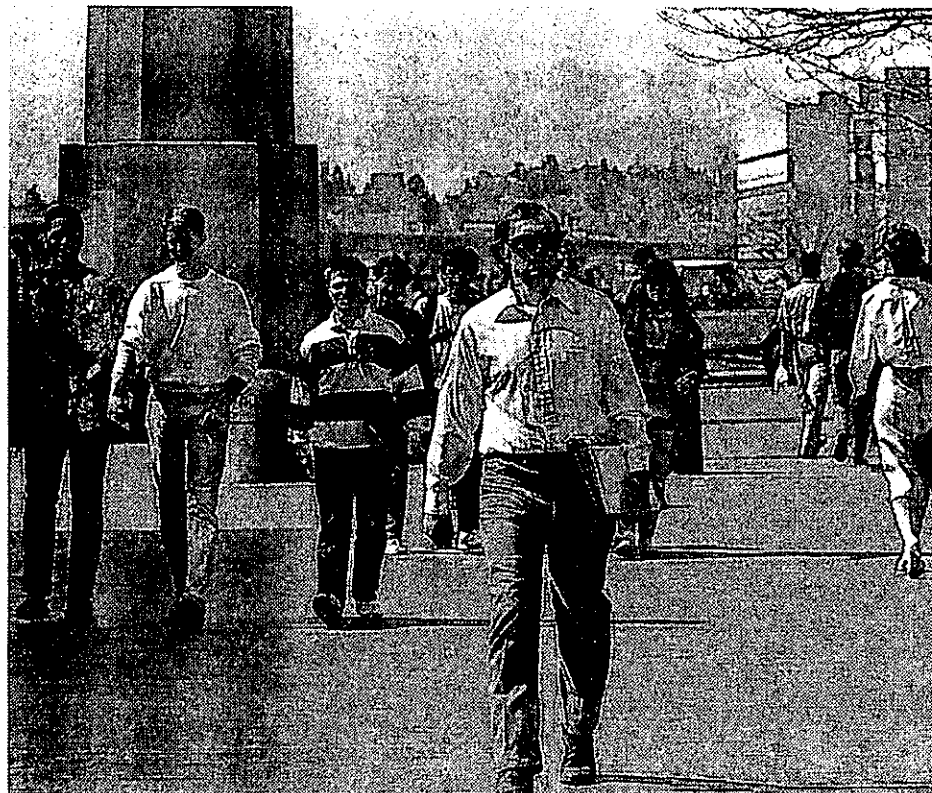
Individuals not admitted to a graduate program who wish to enroll in a graduate-level course may apply for graduate nonmatriculated student (GNM) status. Credits earned as a GNM may be applicable toward a degree upon subsequent admission to a graduate program. Application forms are available from participating departments. The Graduate School: Graduate Study section of this catalog offers more details.

UW Distance Learning

UW Distance Learning offers approximately 130 credit courses. Courses are delivered by print, video or computer and typically consist of assigned texts, study guides, assignments and examinations. Most courses use email and voice mail to enhance interactions with instructors as well as other students. Many new online and video courses are being developed. Certain non-credit courses required for University entrance are available to those who wish to qualify for admission. Other courses provide subject matter for professional continuing education.

Courses are open to persons who, because of distance, work schedule, physical disability or educational preference, require an alternative to on-campus classroom meetings. Matriculated University students often find Distance Learning a convenient way to earn credits during summers or leaves of absence or a way of taking courses that would otherwise be unavailable due to schedule conflicts.

Formal admission to the University is not required for enrollment in Distance Learning. Students may register at any time for most courses and have between three months and one year in which to complete their work. As many as 90 credits earned through Distance Learning may be applied to a University baccalaureate de-



gree. Upon successfully completing a course, the grade and number of credits earned are recorded on an official University transcript. Grades earned, however, are not computed in the University GPA, which is based solely on courses taken in residence.

UW Distance Learning catalogs may be obtained by telephone, (206) 543-2350 or 1-800-543-2320; by writing to UW Distance Learning, UW Extension, Box 354223, Seattle, WA 98105-4190; by sending email to instudy@u.washington.edu (include name, address, and social security number).

English As A Second Language Department

The English As A Second Language (ESL) Department provides nonnative speakers of English who are interested in improving language skills with the following services and resources:

1. Academic ESL courses for UW students. English is the language of instruction at the University, and many international students need additional English training to facilitate participation in regular University programs.

International students (whose native language is not English) admitted with TOEFL scores of at least 500 but below 580, or Michigan Proficiency Test scores of at least 80 but below 90, are required to take the University's ESL diagnostic test before matriculating. Students whose test results show their English to be adequate for full-time University study are excused from ESL course work. Others must take those ESL courses designated as required each quarter until the language requirement is completed.

During the academic year, the courses offered are designed for international students officially enrolled in a degree program at the University as either undergraduate or graduate students. These students take ESL courses along with their regular programs of study. English As A Second Language courses count

as the equivalent of 5 credits each for the purposes of satisfying visa requirements but do not count toward graduation. Special fees are charged for these courses instead of tuition.

2. UW Extension ESL courses for all nonnative speakers. The ESL Department offers a separate series of noncredit courses that are open year-round to any adult nonnative speaker who would like to study English. These courses do not require formal admission to the University. Application may be made to the address below.

Additional information about ESL services, including complete listings and descriptions of current ESL course offerings at the University, is available from the ESL Department, Box 354232, Seattle, WA 98195-4232, telephone (206) 543-6242.

Noncredit Classes

UW Extension offers a broad range of courses, certificate programs, institutes, conferences and seminars for adults, students and children. Noncredit classes offer opportunities for professional development and personal enrichment. Specific programs are announced quarterly in the UW Extension catalog. To receive a catalog, call (206) 543-2320.

Client Relations and Advising

UW Extension is committed to providing needed resources and skills to the Puget Sound community. Through its Department of Client Relations and Advising, companies are contacted and customized training programs are provided. Information meetings on various courses are held at companies, on campus and in downtown Seattle. Advisers are available to answer questions on any of UW Extension's credit or noncredit courses or certificate programs.

University of Washington, Bothell

The University of Washington, Bothell (UW Bothell) admitted its first students in autumn quarter 1990 and has grown rapidly. UW Bothell is fully accredited as part of the University of Washington and awards a University of Washington degree. In addition, professional programs are accredited by their respective accrediting bodies.

All programs give particular attention to the development of skills appropriate to an advanced level of study, to writing and oral communication, to the analysis and assessment of information, and to collaborative work with other students. At present the following programs are offered: Bachelor of Arts in Liberal Studies, Bachelor of Arts in Business Administration, Bachelor of Science in Nursing, Master of Education, and a postbaccalaureate Teacher Certification Program for elementary school teachers. As state funding permits, concentrations will be added in existing programs and additional undergraduate and graduate degree programs will be considered.

UW Bothell is committed to increased access to higher education for residents of north, northwest, and northeast Puget Sound. To serve a diverse student population, most programs offer part- and full-time study options, with both day, late afternoon, and evening classes. The teacher certification program requires full-time study. With the exception of the nursing and teacher certification programs, students may enter any quarter. Financial aid and a tuition installment plan are available.

UW Bothell is temporarily located in the Canyon Park Business Center, near the intersection of Interstate 405 and State Route 527. The future location of UW Bothell will be at the Truly Farms site, at the intersection of Interstate 405 and 195th Avenue, where Cascadia Community College will also be located.

Degree Programs

Detailed descriptions of the academic programs offered at UW Bothell may be obtained by calling the Office of Admissions at (206) 685-5000 or 1-800-736-6650. A brief overview of the programs is provided below. Undergraduate programs are offered at the upper-division level; students are expected to have completed their first two years (90 quarter credits) of college study prior to entry, and then to complete 90 additional credits at the upper-division level to earn the bachelor's degree. The teacher certification program is offered as a postbaccalaureate program. The Master of Education degree requires a minimum of 45 credits.

Liberal Studies: The liberal studies program is an innovative and interdisciplinary program combining the methods, materials, and intellectual tools of the humanities, social sciences, and sciences. Because the ability to think, write, and speak effectively is a vital part of a liberal studies education, the program is designed to improve competence in these essential skills. The program leads to a Bachelor of Arts with concentrations in: American studies; society, ethics, and human behavior; culture, literature, and the arts; international political economy and comparative cultures; and science, technology, and the environment.

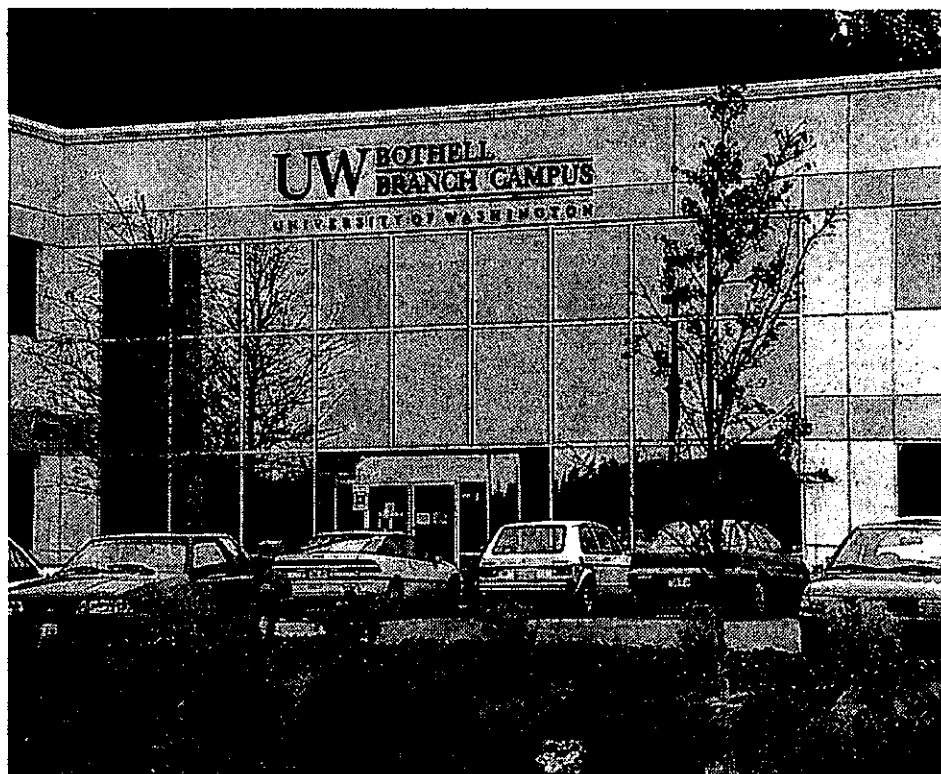
Business Administration: The business administration program offers an integrated approach to the study of business. The curriculum focuses on essential busi-

ness core courses and currently offers concentrations in both marketing or management. The program emphasizes effective oral and written communication, teamwork in a diverse workforce, entrepreneurial management, high technology and the global business environment. With close ties to the greater Seattle business community, a "real world, hands on" approach is offered. In addition, business students complete courses in liberal studies to better understand the larger social and cultural context in which business functions. The program offers a Bachelor of Arts in Business Administration which is accredited by the American Assembly of Collegiate Schools of Business (AACSB).

Nursing: The Bachelor of Science in Nursing program at UW Bothell is specifically designed for registered nurses who have at least 90 transferable college credits. Through a credit by examination mechanism, nursing students may earn their junior year credits. The program prepares professionals for the broader scope of current nursing practices and evolving future opportunities. Critical thinking, decision making, and oral and written communication are emphasized. The Bachelor of Science in Nursing program at UW Bothell is accredited by the National League for Nursing and is affiliated with the UW School of Nursing. The program begins annually in summer quarter; electives may be taken prior to summer quarter. As state funding permits, a Master of Science in Nursing will be initiated in autumn quarter 1997.

Education: The UW Bothell teacher certification program leads to Washington State teacher certification for grades K-8. It is a full-time, 12 month postbaccalaureate program designed for those who already hold a bachelor's degree. Through collaborative partnerships with area schools, the program integrates courses and structured field experiences in a variety of school settings. This unique program incorporates the most current and thoughtful perspectives on preparing dedicated professionals for classrooms and schools. UW Bothell also offers an interdisciplinary Master of Education degree designed for educators who want to build on their knowledge and skills to create class-

rooms, schools, and communities that support the growth and development of all students. Advanced study is offered in four study options: integrated curriculum; bridges and barriers to school success; multicultural education; and a self-designed option. Critical reflectivity, leadership, and the generation and use of research to improve classrooms and schools are emphasized throughout the program.



University of Washington, Tacoma

The University of Washington, Tacoma (UW Tacoma) opened its doors in 1990. As an upper-level institution, UW Tacoma provides access to a diverse student population through a combination of day, evening, and weekend classes. Undergraduate programs have been created for students who have previously completed two years of college. Undergraduate degrees offered include the Bachelor of Arts in Liberal Studies and in Business Administration, and the Bachelor of Science in Nursing. At the graduate level the Master of Education and the Master of Nursing are available. Additionally, a postbaccalaureate Teacher Certification Program is offered. As state funding permits concentrations will be added to existing programs, and additional options in areas such as social work, management and administration, engineering, science, and society and justice will be considered.

UW Tacoma's location is in an urban center that is redefining the City of Tacoma. The temporary campus is located in two buildings in downtown Tacoma: the Perkins Building at 11th and A Streets, and the Tacoma Security Building on Pacific Avenue. The permanent campus is under construction, and utilizes some of the grand warehouses of old Tacoma which are being remodeled into classroom, office, and library space.

Degree Programs

Detailed descriptions of the academic programs offered can be obtained by calling the Office of Admissions at 1-800-736-7750, and requesting a copy of the current campus catalog. A brief overview of the programs is provided below. All undergraduate programs are offered at the upper-division level; students are expected to have completed their first two years (90 quarter credits) of college study prior to entry, and then to complete 90 additional credits at the upper-division level to earn the bachelor's degree. All programs give particular attention to the development of skills appropriate to an advanced level of study, in writing and oral communication, in the analysis and assessment of information, and in collaborative work with other students in project teams. Graduate programs require a minimum of 45 credits to earn the master's degree.

Liberal Studies: An undergraduate course of study leading to the Bachelor of Arts, with concentrations in United States studies and international studies. The liberal studies program is an innovative, interdisciplinary program combining the methods, materials, and intellectual tools of a number of disciplines devoted to study of the liberal arts and of human beings both as individuals and in societies—disciplines traditionally known as the humanities and social sciences. Students engage in comparative studies of the beliefs, philosophies, arts, and social and economic characteristics of diverse social and cultural groups in the United States and selected regions of the world.

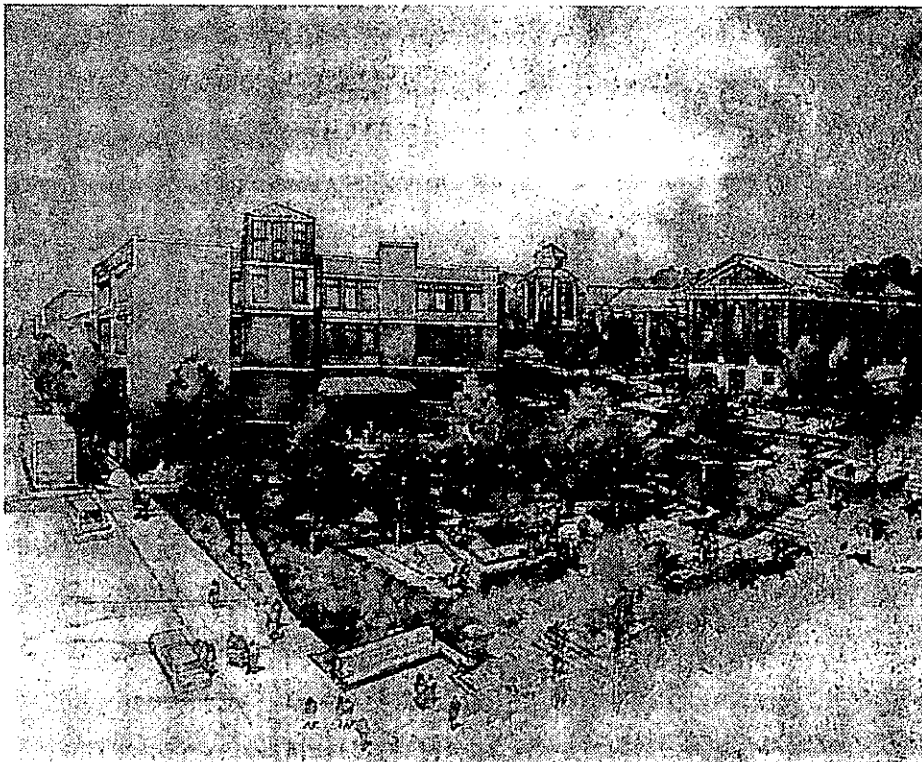
Business Administration: An undergraduate program that leads to a Bachelor of Arts in Business Administration with a concentration in management, marketing, international business, or accounting. The degree is fully accredited by the American Assembly of Collegiate Schools of Business (AACSB). An important element in the program is the emphasis and integration of the traditional business components with interdisciplinary studies. The goal is to prepare students to learn to operate comfortably in a variety of environments and to take a proactive approach to the philosophy of continuous and lifelong learning. The interdisciplinary program emphasizes critical competencies needed to

prepare students to succeed in the business environment of the 21st century. The curriculum is designed around the competencies of teamwork, communication, problem solving, flexibility, strategic thinking, and personal development.

Nursing: An undergraduate course of studies designed for experienced registered nurses, leading to the Bachelor of Science in Nursing; this program is accredited by the National League for Nursing (NLN) and is affiliated with the UW School of Nursing. Through a credit by examination mechanism, nursing students validate learning attained during their professional experience to earn their junior year credits. Full-time students complete the program in four quarters; part-time options are available and are encouraged for students working full-time. Required coursework begins summer quarter; electives may be taken prior to summer quarter. Courses prepare students for professional practice and roles in the complex, changing arena of health care. The Master of Nursing degree program is accredited by NLN and is affiliated with the UW School of Nursing. The program provides advanced study in selected areas of nursing science, professional foundations, scientific and systematic inquiry/research, and related fields of study. Students are provided with opportunities to explore individual interests within the context of the program. The course of study prepares students for advanced and specialized practice. Additional course offerings and opportunities for specialization are planned and will be provided as the campus continues to develop and expand.

Education: a postbaccalaureate course of studies and field experience that leads to Washington State teacher certification for grades K-8. This field-intensive program admits students in the spring to begin the program summer quarter. The program emphasizes preparation for teaching in economically impacted schools and requires one full year of study and practice to complete. The Master of Education degree is a graduate course of studies for experienced teachers at all levels of education, pre-school through adult education. This program emphasizes advanced studies designed to enhance teaching abilities and professional mastery. Four study options and one extended endorsement area are available: integrated curriculum; multicultural education; at-risk youth, with an option of an endorsement in special education; and an individually designed course of study.

Further information may be obtained by contacting the appropriate program office, or the Office of Admissions and Student Services—1-800-736-7750. Academic program numbers are as follows (all 206 area codes): Liberal Studies—552-4450, Business Administration—552-5630, Nursing—552-4470, Education—552-4430.



KEY TO SYMBOLS AND ABBREVIATIONS

KEY TO SYMBOLS AND ABBREVIATIONS

The symbols and abbreviations below are used in the listings of faculty members and course descriptions. Colleges, schools, and departments are presented in alphabetical order. If you are unable to locate the department or program of your choice, consult the Index.

Faculty

Entries include appointment to the Graduate School faculty (indicated by *); year of appointment to the University; graduate or professional degree, date, and institution. Entries also may indicate Acting, Adjunct, Affiliate, Clinical, Emeritus, or Research faculty; and area(s) of interest.

Course Descriptions

Each course listing includes prefix, course number, title, and credits. Each listing also may include general education designator(s), names of instructor(s), description of the course, prerequisite(s), and quarter(s) offered.

Specific information on courses offered in a particular quarter, including descriptions of courses approved since the publication of this catalog, appears in the quarterly *Time Schedule*.

Course Numbers

100-299 Lower-division courses primarily for freshmen and sophomores.

300-499 Upper-division courses primarily for juniors, seniors, and postbaccalaureate (fifth-year) students. Graduate students may enroll in 300- and 400-level courses. When acceptable to the major department and the Graduate School, approved 400-level courses may be applied as graduate credit in the major field and approved 300-level courses may be applied in the supporting field(s).

500- Restricted to graduate students. (Courses numbered in the 500 and 600 series with *P* suffix denote professional courses for students in the schools of Dentistry and Medicine, and such courses may not be applied as graduate credit in the Graduate School.) Undergraduate, postbaccalaureate, and nonmatriculated students who wish to register for 500-level courses must obtain permission from the instructor of the class, departmental Chair, or other designated person.

Graduate courses numbered 600, 601, 700, 750, or 800 are restricted to students in the Graduate School. They appear by number and title only where applicable under the departmental course listings in this catalog. Descriptions for these courses are listed below.

(PREFIX) 600 Independent Study or Research (*)

Individual readings or study, including independent study in preparation for doctoral examinations, research, etc. Prerequisite: permission of Supervisory Committee chair or graduate program adviser.

(PREFIX) 601 Internship (3-9, max. 9)

Internship required of students in a graduate degree program. Permission of Supervisory Committee chair or graduate program adviser is a prerequisite.

(PREFIX) 700 Master's Thesis (*)

Research for the master's thesis, including research preparatory or related thereto. Limited to premaster graduate students (i.e., those who have not yet completed the master's degree in their major field at the University of Washington). Prerequisite: permission of Supervisory Committee chair or graduate program adviser.

(PREFIX) 750 Internship (*)

Internship required of all graduate students in the Doctor of Arts degree program.

(PREFIX) 800 Doctoral Dissertation (*)

Research for the doctoral dissertation and research preparatory or related thereto. Limited to graduate students who have completed the master's degree or the equivalent, or Candidate-level graduate students. Premaster students initiating doctoral dissertation research should register for 600. Prerequisite: permission of Supervisory Committee chair or graduate program adviser.

Credit Designation

ART 100 (5) 5 credits are received for the quarter.

ART 101-102 (5-5) Hyphenated course. Credit is earned, but may not be applied toward graduation until the entire sequence is completed. (An *N* grade may be given the first quarter and the final grade the second quarter.)

ART 100- (5-) Course may take longer than one quarter to complete. Repeated registration may be necessary. An *N* grade is received until the final grade is submitted.

ART 100 (2, max. 8) 2 credits per quarter; course may be repeated up to four times to earn a maximum of 8 credits.

ART 100 (1-5) Up to 5 credits may be taken in a given quarter. Specific number is determined in consultation with instructor or adviser. When a maximum is not stated, the limit of the credit range is also the maximum allowable credit for the course. Compare below for courses with stated maximum credits.

ART 100 (1-5, max. 15) Up to 5 credits may be taken in a given quarter. Course may be repeated to a maximum of 15 credits.

ART 100 (*, max. 10) Credit to be arranged per quarter; course may be repeated to a maximum of 10 credits.

ART 100 (3/5) 3 or 5 credits are earned in a given quarter. Specific amount is determined by school or college offering the course. The *Time Schedule* may indicate 3 credits, 5 credits, or 3 or 5 credits. Credits may vary by section.

ART 100 (3/5, max. 15) 3 or 5 credits are earned in a given quarter. Course may be repeated to earn a maximum of 15 credits.

ART 700 (*) Credit is to be arranged with school or college offering the course. No maximum stated. Only 600-, 700-, and 800-level courses do not require a maximum.

Undergraduate General Education Requirement Designators

VLPA Visual, Literary, & Performing Arts (Areas of Knowledge requirement).

I&S Individuals & Societies (Areas of Knowledge requirement).

NW The Natural World (Areas of Knowledge requirement).

QSR Quantitative, Symbolic, or Formal Reasoning.

C English Composition.

Courses marked **C** may be used for the English Composition requirement or the additional-writing (*W*-course) requirement, but not both; none may count for the Areas of Knowledge requirements. Courses marked **QSR** may be used for both the QSR requirement and an Areas of Knowledge requirement, if one is listed. Courses marked with more than one Areas of Knowledge designator (**VLPA**, **I&S**, and/or **NW**) may be used for any one of the areas indicated, but not for more than one.

Background Required

Prerequisites Courses to be completed or conditions to be met before a student is eligible to enroll in a specific course.

Quarters Offered

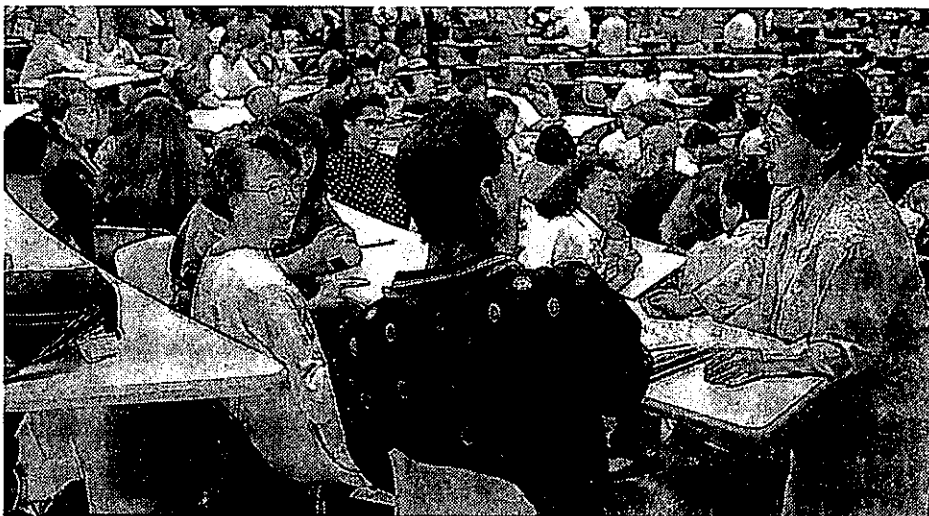
A,W,Sp,S Indicates the quarter(s) the course is offered. A = Autumn, W = Winter, Sp = Spring, S = Summer.

Examples:

ART 100 AWSp ART 100 offered Autumn, Winter, and Spring quarters.

ART 100, 101 A,W ART 100 offered Autumn Quarter. ART 101 offered Winter Quarter.

ART 100, 101 AW,WSp ART 100 offered Autumn and Winter quarters. ART 101 offered Winter and Spring quarters.



ACADEMIC PROGRAMS, FACULTY, AND COURSES

College of Architecture and Urban Planning

224 Gould

Dean

Jerry Finrow

Associate Deans

Katrina Deines
James Donnette
Anne Vernez Moudon

The College of Architecture and Urban Planning (CAUP) comprises four departments that are directly concerned with the design and development of the physical environment: Architecture, Building Construction, Landscape Architecture, and Urban Design and Planning.

The College offers a variety of programs and degrees focusing on the environmental design disciplines within a liberal arts education. The undergraduate programs of the departments of Building Construction and Landscape Architecture lead to the professional degrees that serve as the educational credentials for careers in their respective fields. The preprofessional undergraduate degree in architectural studies prepares students for professional programs as well as related roles in society. Master's degrees are also offered in the College: Master of Architecture, Master of Science in Construction Management (evening degree), Master of Urban Planning, and Master of Landscape Architecture. Master's students may elect to work toward the Certificate in Urban Design or the Certificate in Preservation Planning and Design. An interdisciplinary doctoral program in urban design and planning is available through the Graduate School. All curricula encompass an appropriate level of design and technical understanding and include broader social, economic, and cultural issues fundamental to understanding, preserving, and enriching our built and natural environments.

As part of a major university and metropolis in the Pacific Northwest, the College is able to reinforce its program by using its setting as a laboratory for study. It works closely with its various professional communities to build curricula and a faculty attuned to the understanding and creation of an appropriate physical environment.

Cascadia Community and Environment Institute

410 Gould

Anne Vernez Moudon, Director

Cascadia Institute emphasizes interdisciplinary education and applied research in community and environment. Research activities are shaped by the needs

of clients in the community. Areas of emphasis are flexible, reflecting current planning and design issues.

Housed in the University's College of Architecture and Urban Planning, Cascadia Institute draws upon College disciplines—architecture, building construction, landscape architecture, and urban design and planning—as well as other University disciplines such as public policy, law, business, and social work.

Interdisciplinary Research Centers include:

- Center for Real Estate and Community Development
- Center for Architecture and Education:
- Design of Learning Environments
- Center for Sustainable Communities

Educational programs include:

- Certificate Programs
- Urban design
- Preservation planning and design
- Continuing Education/Extension Programs
- Architecture
- Facilities management
- Real estate

Preservation Planning and Design Certificate Program

410 Gould

Gail L. Dubrow, Director
Neile Graham, Program Coordinator

The College of Architecture and Urban Planning administers a special graduate-level program that leads to the Certificate of Achievement in Preservation Planning and Design. This 45-50 credit interdisciplinary program is available to students accepted for graduate work by the departments of Architecture, Landscape Architecture, or Urban Design and Planning. There are two tracks in this program: one for students in architecture and the other for students in landscape architecture and urban planning. The curriculum offered by the 15-member faculty, which is drawn from the College along with visiting lecturers from the preservation community, provides students with a grounding in the history, theories, methods, and practices of historic preservation planning and design.

Urban Design Certificate Program

410 Gould

George Rolfe, Director
Neile Graham, Program Coordinator

The College of Architecture and Urban Planning administers a special graduate-level program that leads to the Certificate of Achievement in Urban Design. Since 1968, this interdisciplinary program has provided a collective framework that allows students to specialize in the study and design of the urban environment as part of their professional education.

The 14-member faculty offers backgrounds in urban design as well as in architecture, landscape architecture, and urban planning. In addition, the communities of the Puget Sound region provide a unique learning laboratory for students to experience the issues and professional activities of urban design. A core curriculum and mandatory course work in four substantive areas provide the student with a firm grounding in theory, methods, and practical skills. The program is normally seven quarters in length, concurrent with the master's program.

Students accepted for graduate work by the departments of Architecture, Landscape Architecture, or Urban Design and Planning are eligible for the program if they possess the necessary design abilities prior to enrollment in advanced studios.

International Programs

224 Gould

The departments of the College offer many opportunities for foreign study in which participants earn academic credit while studying abroad. Programs in Rome, the Italian Hill Towns, and Mexico are sponsored on a regular basis. In addition, various study and exchange opportunities exist in such locations as Germany, the Scandinavian countries, Colombia (South America), Mexico, and Japan. Faculty exchanges with foreign institutions occur regularly.

University of Washington Rome Center

95 Piazza del Biscione, Rome, Italy

The College maintains a permanent year-round facility in Rome. Studio and classroom spaces, a library, administrative offices, and housing accommodations for faculty are located in the Palazzo Pio on the Campo de' Fiori. The Rome Center is used by UW programs in Classics, Romance Languages, Art, Art History, and Comparative History of Ideas, as well as by the Departments of the College of Architecture and Urban Planning. The Rome Center fosters interaction among students from the University and other institutions, together with practicing professionals residing in or visiting Rome. Several major universities regularly share studio critics and lecturers.

Remote Sensing Applications Laboratory

12 Gould

Frank Westerlund, Director

The Remote Sensing Applications Laboratory (RSAL) is a facility for teaching, research, and public service applications of remote sensing and geographic information technologies in environmental planning and design. Remote sensing includes aerial photography and satellite systems such as Landsat for recording earth surface data in image or digital form for subsequent interpretation by visual or computer techniques and incorporation into geographic information systems. Research applications have included land-use mapping, urban form analyses, growth management studies, development siting, natural resource inventories, and environmental analysis. The RSAL houses an extensive collection of air photo, satellite data, map, and documentary resources. In addition to optical photo interpretation equipment, the laboratory utilizes UNIX workstation-based software systems such as ERDAS for digital image processing and the ARC/INFO geographic information system.

Facilities

Computing

A wide variety of computers, software, networks, computing facilities, and support services are available to CAUP students through UW Computing & Communications and College-operated labs for studies and research in Computer Aided Design (CAD) and Geographic Information Systems (GIS).

UW Computing & Communications (C&C) offers faculty, staff, and students free accounts on C&C Uniform Access computers, which provide a variety of computing resources and information technologies such as email and UWIN. Establishing a Uniform Access account allows attachment to the campus network, and, in turn, connection to a vast national and international collection of networks, computer users, computers, and bibliographic and other library resources. C&C

also offers computer labs where you can find software tools running on PC and Macintosh computers, NetXtend workstations, and X terminals.

CAUP facilities, composed of both Macintosh and PC computers, are connected in a College network which, in turn, is connected to the Internet. UW computing and data resources are available through these machines. The College employs one full-time Computer Resources Manager and several student consultants, also known as the Motley Crew or Mots.

General purpose labs are available to all CAUP students. They are networked to file servers, plotters, and laser printers. A wide variety of software is available including spreadsheets, word processors, CAD, GIS, 2D and 3D graphics, rendering, animation, scheduling, estimating, bid analysis, project management, modeling, and design programs. Furthermore, all labs support email. Hours of access to these labs generally parallel those of the College library except when classes are in progress.

For advanced course work, research, and certain independent studies, the College operates specialized labs such as the Multimedia Lab with its high-performance PowerMac workstations along with peripherals including CD-ROM drives, scanners, and a video digitizing (capturing) system. Also, a SUN Workstation located in the Remote Sensing Applications Lab (see above) supports advanced research applications of GIS, remote sensing/image processing, and visual and other simulation modeling.

Lighting Applications Laboratory

The Lighting Applications Laboratory includes a variety of facilities for use by students and faculty members in conjunction with lighting classes, design studio courses, and research work. Equipment in the lighting workshop includes lamps and lighting fixtures, sample models and model-building materials, a mirror-box artificial sky, a direct-beam sunlight simulator, assorted light meters and data loggers, cameras, and demonstration displays.

The Department of Architecture is a cosponsor of the Lighting Design Lab. This lab, a 10,000-square-foot, half-million dollar facility, was designed to demonstrate the energy conservation potential of state-of-the-art architectural lighting technology. It is operated by Seattle City Light in downtown Seattle. Students can take various positions in the lab as interns. It is also available to assist in their lighting design and testing, as it does with regional architectural offices.

Photography Laboratory

A large photography laboratory is provided with studio and darkroom facilities for use by photography classes, design studio classes, special instruction, and independent activity.

Shop

A fully staffed and equipped wood-, plastic-, and metal-working shop provides students with an opportunity to design and build selected projects. The shop is used as an instructional facility in conjunction with studio, structures, and materials classes. Thesis and other individual activity also can be accommodated.

Library

The Architecture-Urban Planning Library, 334 Gould, is a branch of the UW Libraries. It is the primary location for materials on architecture, building construction, landscape architecture, and urban design and planning. The collection numbers 38,150 volumes, 7,500 microforms, and 300 currently received serial subscriptions. Computer terminals connect to the Libraries' Online Public Catalog and a number of databases on the campus network including Avery Index to Architectural Periodicals, Business Index, ERIC, Expanded Academic Index, INSPEC, PAIS, and PsycINFO. Library terminals also provide a linkage to other libraries on the Internet via the campus network. Art Index, Applied

Science and Technology Index and NTIS Index on CD-ROM are accessible through a local area network connection in the library. This network is also a pathway to the World Wide Web.

Slide Collection

The slide collection consists of approximately 100,000 images covering architectural, landscape, design and planning, and construction subject matter, supporting the curricular and research needs of the College. New materials for lectures and projects are continually added.

Student Organizations

Chapters of American Institute of Architects Students, American Society of Landscape Architects, Associated General Contractors, Planning Students Association, and the Historic Preservation Association provide opportunities for undergraduate and graduate students to meet informally and to participate in a variety of projects and events.

College Bachelor of Arts Programs

Bachelor of Arts in Architectural Studies, *see Architecture*.

Bachelor of Arts in Community and Environmental Planning, *see below*.

Community and Environmental Planning

410 Gould

Undergraduate Program

Bachelor of Arts

The Bachelor of Arts degree program with a major in community and environmental planning is offered through the College as one of the University's Interdisciplinary Undergraduate Programs (IUP). It is administered by the Community and Environmental Planning Advisory Committee.

The Community and Environmental Planning (CEP) program provides a multi-disciplinary study of several contemporary academic fields and areas of research. These include: the study of communities, the analysis of natural and built environments, and the investigation of the theory and practice of planning. The CEP program is designed to foster both student- and community-based undergraduate learning experiences.

Students in the major form learning groups of seventeen. Each group comprises a community of mutual learning that requires commitment, personal investment, and strong teamwork strategies from each individual for the duration of the major. Collaboratively, students engage the core content of the program—community, environment, and planning—through six interconnected seminars. The junior-year seminars emphasize the development of a broad knowledge base and a strong theoretical grounding in these areas. The senior-year sequence has an experiential, practice-based focus in which students pursue an independent internship in their communities. With guidance from peers and faculty, each student designs an individual learning plan of courses drawn from a rich array of undergraduate offerings at the UW. The Edward E. Carlson Leadership and Public Service Office provides guidance for the student's community involvement and field experience. Scholarly and logistic support from the Carlson Office gives students the explicit and necessary connection between theoretical and experiential learning. Students explore how to work together constructively to anticipate and address

critical issues facing the complex communities and world they inhabit.

The CEP major represents an intersection; it is a "crossroads" of theoretical, applied, and participatory learning. Specifically, students combine their breadth of knowledge with depth in methods from their cross-disciplinary course work and field experiences to explore their research interests and pursue their professional goals. It is a pathway to vocational accomplishment by which each student develops conceptual understandings and practices. The program supplies the student with a toolbox of invaluable knowledge and skills that they will find crucial in the changing work place. CEP prepares students to become effective citizens, capable of acting with a conceptually broad and ethically responsible vision in a diverse and dynamic society. CEP education creates understanding, qualifications, and readiness for careers in interdisciplinary fields such as social education, planning, ecology, community and environmental activism, community organization and development, and government-community negotiation and interaction. CEP also promotes strong preparation for graduate and professional education in fields such as law, public policy, urban design and planning, social analysis, media arts, environmental regulation, and advocacy. CEP prepares individuals to assume important roles in the difficult public issues that define the present era.

The major is open to students with varied interests and capacities who apply in the spring quarter of their sophomore year. Students admitted begin in autumn quarter.

Admission Requirements: Junior standing (90 or more credits completed), including successful completion of a liberal arts background and acceptance by the program admissions committee. The liberal arts requirements for the degree, normally taken prior to admission, include English Composition (5 credits); Visual, Literary, & Performing Arts (20 credits); Individuals & Societies (20 credits), from recommended courses in social sciences and environment, environmental values and perceptions, and environmental conflict management and law; Natural World (20 credits), from recommended courses in physical environmental sciences and problem-solving, environmental chemistry, ecology and biosphere, conservation biology, environmental systems design and analysis, and MATH 124 or 157; Quantitative and symbolic reasoning (5 credits) from any area above; and general electives (25 credits), with CEP 120 recommended. For alternative recommended courses, visit the CEP Office in 410 Gould. Ten credits of writing-intensive courses are to be included in the 90 credits. While the cumulative GPA is an important admissions evaluation factor, the committee will place emphasis on the student's statement of intent, an autobiographical statement, written responses to three selected questions, previous academic work, and the results of an informal interview with faculty and students in the program. Applicants will be notified of the results by the end of spring quarter. Due to the nature of the major's learning group structure, admission will be limited to space available in the core seminars.

The application deadline is May 1 for admission the following autumn quarter. Applications are available in 410 Gould, 543-4190.

Graduation Requirements: Satisfactory completion of 180 credits of course work, including 90 credits of liberal arts and 90 credits within the major (30 credits of core seminars, 5 credits of internship, 25 credits of selected methods courses, and 30 credits of electives). Methods courses may cover ways of knowing, of thinking, and of solving problems and issues. Courses which fulfill this requirement include qualitative and quantitative methods from the social, natural, and physical sciences; quantitative reasoning; interpretation; critical theory and analysis; computer applications; group dynamics and facilitation; ethics and philosophy; organizational theory; speech communication; writing; and research methods.

Advising: Advising for program premajors is available in the Undergraduate Advising Center, 9 Communications, 543-2551. Advising for CEP majors is available in 410 Gould, 543-4190.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

CEP 120 Introduction to Community and Environmental Planning (5) I&S Introduction to central themes of major. Opportunities to engage in community action and planning process, while developing ecological literacy. Lectures, discussions, community service learning, and critical writing exercises combine to increase knowledge and interest in these fields. Emphasis on developing community of learners in and out of classroom setting. Offered: ASP

CEP 301 The Idea of Community (5) I&S Theories of community and communal rights and responsibilities. Experience building a learning community within major. Explores struggles for community in every sector of life. Witnessing essentials of community through service and field experiences, students construct individual curriculum and learning plans for major, selecting cross-disciplinary work. Credit/no credit only. Offered: A.

CEP 302 Environmental Response (5) I&S Explores issues of environmental crisis and societal responses. Readings and reflective analysis from broad selection of authoritative sources to develop grounded perspective in ecological literacy and consciousness. Concurrently, experiential education in challenges and practical responses to building sustainable society through participation in community-based environmental effort. Credit/no credit only. Offered: W.

CEP 303 Social Structures and Processes (5) I&S Investigates use of formal and informal social structures and processes within context of community and environment. Looks culturally at patterns and institutions of social organization and relationships among different sectors. Issues of interrelatedness, citizenship, knowledge, and communication. Participation in local community service organization. Credit/no credit only. Offered: Sp.

CEP 448 Internship (5) Connects core and individual courses with field work. Group and individual readings develop understanding of how students' internships and field placements constitute particular element of community and environmental planning. Explores how what we do for a living is part of our lives as citizens and public service. Credit/no credit only. Offered: AWSp.

CEP 460 Planning in Context (5) I&S Examines theory against backdrop of practice for broad, historical understanding of social, political, environmental planning. Critique from viewpoints, e.g., planning history, ethics, ecofeminism, environmental justice, class and capitalism, planning and global economy. Develop personalized history reflecting individual experience, professional experience, and philosophical heritage of planning profession. Credit/no credit only. Offered: A.

CEP 461 Ethics and Identity (5) I&S Examination of personal, societal, vocational, environmental, planning ethics. Readings and discourse on ethical foundations for public life. Individual and group readings on values, human potential. Develops understanding of ecological content, moral responsibility, self-awareness. Constructs positive, diverse view of humanity, environment regardless of race, gender, ethnicity, beliefs. Credit/no credit only. Offered: W.

CEP 462 Community and Environment (5) I&S Capstone quarter merges core seminars, disciplinary

courses in major, community field experiences for mastery of personal knowledge and skills. Reflection and synthesis of themes in major; engagement with contemporary issues. Compares theoretical definitions of community and environment with individual philosophies and knowledge within thoughtful, applied context. Credit/no credit only. Offered: Sp.

CEP 499 Undergraduate Independent Study or Research (1-5, max. 10) Individual reading, research, fieldwork, other special project approved and supervised by faculty adviser most appropriate for the project proposed. Report on the purposes, procedures, and results of study is required. Prerequisite: senior standing in CEP major and permission of supervising instructor. Credit/no credit only. Offered: AWSpS.

Architecture

208 Gould

The Department of Architecture offers two degrees: the Master of Architecture (M.Arch.) degree, an accredited professional architectural degree, and the Bachelor of Arts degree in architectural studies. The professional program is based on the architect's need to be a generalist well-rounded in the liberal arts, with a full command of the discipline of architecture, who can assume an enlightened, responsible, and creative role in society. The B.A. in architectural studies is a preprofessional degree preparing candidates for admission to professional architectural programs with advanced standing, as well as for other roles in society—in research, government, development, management, planning, etc. While most of these occupations do not require a professional license, they do require an understanding of and exposure to a professional education.

The curriculum embodies a range of both broad and focused courses that cover the many and various aspects of architecture: design, graphics, structural engineering, building sciences, history, theory, ecology, sociology, psychology, law, and professional practice. The faculty comprises a large and diverse group of teachers, practitioners, scholars, and researchers, who represent a wide spectrum of background, experience, and viewpoints. Thirty-five permanent faculty members are supplemented by dozens of part-time professional practitioners from the region and around the country, as well as by exchange scholars from foreign institutions.

Priorities stressed by the faculty reflect changing notions of architecture. Studios are sequenced, providing greater option or specialization and demanding an increasingly independent attitude at the advanced level. The studio sequence not only helps to clarify the student's experience, but also insures that students get a broad and coherent cross-section of design problems and instructors.

Architectural education at the University of Washington requires a minimum of six years of higher education to attain the first professional degree, Master of Architecture. The curriculum is divided into three two-year segments of course work. The first two-year segment is taken prior to admission to the College of Architecture and Urban Planning. It includes 20 credits of preparatory architectural course work, which must be taken at the UW, in addition to a broad liberal arts foundation in humanities, social sciences, natural sciences (including mathematics), and electives to provide for some free exploration. These liberal arts courses may be taken at the UW or at any other institution, as long as they meet the transfer equivalent standards of the UW.

Upon admission to the College of Architecture and Urban Planning, students may elect a major in architectural studies administered by the Department of Architecture. This second two-year segment, consisting of upper-division courses, offers basic

preprofessional studies in architectural design, theory, and technology, with an appropriate balance of upper-division electives taken within the disciplines of the College and the University. The College of Architecture and Urban Planning awards a Bachelor of Arts with a major in architectural studies upon completion of this second segment.

The professional degree, Master of Architecture, is awarded only upon completion of the third segment. The curriculum of the graduate program is composed of two years of course work emphasizing the development of skills and knowledge required by the practicing architect. Students must also complete a master's thesis, extending over one or more additional quarters, on a research topic or design problem of their choice. Successful completion of this nationally accredited program fulfills the educational requirement to qualify as an applicant for licensing (registration) as an architect. Admission to the professional program requires admission to the Graduate School of the University of Washington.

Undergraduate Program

Bachelor of Arts

The College of Architecture and Urban Planning offers a Bachelor of Arts degree program with a major in architectural studies administered by the Department of Architecture. Building on a firm liberal arts foundation, the undergraduate curriculum provides a broadly based general education with a focus on architecture and the built environment that prepares the student for professional level graduate work in architecture or an allied discipline. In addition, it provides a general education to prepare students for a wide variety of study and career opportunities in business, government, and other professions.

Years 1 and 2 of the curriculum have three basic educational objectives: (1) to increase the student's ability to understand, evaluate, and communicate ideas; (2) to prepare students to make informed decisions regarding their academic and career choices; and (3) to provide a broad academic foundation of principles in subject areas considered essential to subsequent study in architecture.

The objectives of years 3 and 4 are: (1) to provide a firm foundation in the vocabularies, principles, and interrelationships of a broad range of environmental design influences essential to professional work in architecture; and (2) to provide opportunities for students to develop their basic skills, knowledge, perceptions, and insights in areas related to the built environment.

Before applying to the College of Architecture and Urban Planning program (the second two-year segment), students must take 20 credits of preparatory architectural course work at the UW. These courses can be taken through UW Extension prior to gaining admission to the University proper, or can be taken during the sophomore year on campus. Application to the architectural studies major is made at the junior level. After acceptance to the architectural studies major, students must complete 90 additional credits before receiving the Bachelor of Arts degree.

Admission Requirements: Admission for autumn quarter only. Application filed by May 15. Prerequisite courses must be completed by autumn quarter. Admission course prerequisites are: 5 credits English Composition, 20 credits each in Areas of Knowledge, 5 credits of electives for a total of 70 credits. Pre-CAUP to include CAUP 200 (3 credits); ARCH 350, 351, 352 (9 credits); and ARCH 210, 211 (8 credits) for a total of 20 credits.

Graduation Requirements: Satisfactory completion of 180 credits of course work in the following three categories: 70 credits of liberal arts course work, 20 credits of preparatory architectural course work, 69 credits of preprofessional course work, and 21 credits

of approved upper-division electives. The final 45 credits must be completed as a matriculated student in residence at the UW. To be eligible for graduation, students must maintain a minimum 2.50 cumulative GPA for all work done in residence.

Advising: Advising for program premajors is done the Undergraduate Advising Center, 9 Communications, 543-2551. Advising for architectural studies majors is provided by the program faculty adviser in the College of Architecture and Urban Planning, 208 Gould, 543-4217.

Minor

Minor requirements: 25 credits to include a minimum of 20 credits in architecture courses (at least 9 credits at the upper-division level) and 5 additional upper-division credits from courses in the College.

Graduate Program

Master of Architecture

The Master of Architecture degree is the only professional degree offered by the Department of Architecture. Completion of the requirements of this nationally accredited degree program satisfies the usual educational requirement for licensing (registration) as an architect. The program accommodates three groups of undergraduate-degree holders: (1) persons holding a preprofessional four-year degree, such as the College's Bachelor of Arts with a concentration in architectural studies, (2) persons holding an undergraduate degree in a field other than architecture, (3) persons holding a professional degree such as a five-year Bachelor of Architecture. The program varies in duration and specific course work required, depending on the student's prior academic and professional experience and whether the student elects to pursue a Certificate of Achievement in Urban Design or Preservation Planning and Design.

Candidates with a preprofessional four-year degree, such as Bachelor of Arts (in architecture) or the equivalent, usually undertake six full-time quarters of study plus completion of a thesis for the M.Arch. degree. This program typically requires 99 credits of course work, including 36 of design studio, 36 of approved core courses, 9 of thesis, and 18 of electives. Special interests and certificate programs often can be accommodated within the 18 credits of electives and design studio options.

Persons holding degrees in other fields normally undertake three quarters of preparatory course work to develop knowledge and skills equivalent to those of students who enter the program from undergraduate architecture programs. Upon completion of preparatory course work, the students merge with students in the two-year program described above.

Candidates holding an accredited architectural degree, such as the five-year Bachelor of Architecture, may undertake postprofessional study culminating in the Master of Architecture degree. For these candidates the program represents a specialization or in-depth study of a specific area or interest in the field. Each student's program is developed on an individual basis in consultation with faculty advisers. The approved program of study becomes the student's curriculum, which must be completed for award of the degree. Typically this program involves a minimum of 45 credits of required course work, including a thesis, and may be completed in four or five quarters.

Students are admitted to the program in architecture only in autumn quarter. All application materials should be received by the department no later than the preceding January 15. Notices of admission are mailed in early April. The prospective applicant should note that in addition to Graduate Record Examination general test scores, transcripts of previous degree programs and of additional academic study, with a 3.00 grade point requirement, three letters of recommendation, a

statement of intent, and a portfolio of work in some field or aspect of art, craft, or design are required as part of the application. Incomplete applications and those received after January 15, are not considered by the admissions committee.

Graduate students may elect to participate in the College-wide certificate programs in urban design and preservation planning and design. See program descriptions in the preceding College section.

The department offers the Architecture in Rome program at the University of Washington Rome Center. Students may study for one or two quarters in Rome with departmental faculty members and guests. Other programs include study in Mexico, Italian Hill Towns, and numerous exchanges including Scandinavia, England, Germany, Hong Kong, Bogota, Japan, and Australia.

Financial Aid

Each spring quarter, the department awards scholarships and assistantships that apply to the following academic year. These are more typically available to students already enrolled in the program in architecture at the time of the awarding, although some financial aid is offered to newly entering students. Other financial aid and assistantship possibilities may be found through the Graduate School Fellowship Division and the Office of Student Financial Aid in Schmitz Hall.

Faculty

Chair

Douglas Zuberbuhler

Professors

Bonsteel, David * 1963, (Emeritus); MArch, 1964, University of Washington; design process, computer applications, research.

Bosworth, Thomas L. * 1968; MA, 1954, Oberlin College; MArch, 1960, Yale University; design process, history, professional practice.

Ching, Francis D. K. 1985; BArch, 1966, University of Notre Dame; design graphics.

Clausen, Meredith L. * 1979; PhD, 1975, University of California (Berkeley); aesthetics and twentieth-century architecture.

Dietz, Robert H. * 1947, (Emeritus); MArch, 1944, Massachusetts Institute of Technology; design, housing.

Emery, Ashley F. * 1961, (Adjunct); MS, 1958, PhD, 1961, University of California (Berkeley); bioengineering, energy conservation in buildings and air conditioning.

Finrow, Gunilla Kristina 1995; MArch, 1967, University of California (Berkeley); architecture, interior architecture.

Finrow, Jerry V. * 1995; MArch, 1968, University of California (Berkeley); housing architecture.

Grey, Arthur L. * 1963, (Emeritus); PhD, 1954, University of California (Berkeley).

Hildebrand, Grant * 1948; MArch, 1964, University of Michigan; history, preservation design.

Jacobson, Phillip L. * 1962, (Emeritus); MArch, 1969, Finnish Institute of Technology; design, professional practice.

Johnston, Norman J. * 1960, (Emeritus); PhD, 1964, University of Pennsylvania; urban design, history.

Kelbaugh, Douglas S. * 1985; MArch, 1972, Princeton University; design, energy conservation, professional practice, theory.

Kiyak, H. Asuman * 1972, (Adjunct); MA, 1974, PhD, 1977, Wayne State University; geriatric dentistry, behavioral aspects of health care.

Kolb, Keith R. * 1952, (Emeritus); MArch, 1950, Harvard University; design, professional practice.

Lovett, Wendell H. * 1948, (Emeritus); MArch, 1948, Massachusetts Institute of Technology; architecture.

Nyberg, Folke E. * 1969; MArch, 1960, Yale University; theory, urban design, professional practice.

Pundt, Hermann G. * 1968; PhD, 1969, Harvard University; history, historical preservation.

Pyatok, Michael * 1990; MArch, 1967, Harvard University; design of affordable housing for lower income communities - urban and suburban regions.

Schneider, Raymond C. * 1964, (Emeritus); EdD, 1955, Stanford University; educational facilities design.

Seligmann, Claus * 1964; Diprch, 1950, London Polytechnic (UK); design, design process, theory.

Small, Robert * 1965, (Emeritus); MArch, 1955, University of Oregon; design, community practice, barrier-free design, housing, site planning, design process.

Staub, Christian 1967, (Emeritus); Certificate, 1944, Swiss Institute for Industrial Design, Arts & Crafts; photography.

Streatfield, David C. * 1974, (Adjunct); MLA, 1965, University of Pennsylvania; regional landscape planning; landscape, architectural and environmental history.

Streissguth, Daniel M. * 1955, (Emeritus); MArch, 1949, Massachusetts Institute of Technology; design process.

Thiel, Philip * 1961, (Emeritus); MS, 1948, University of Michigan; visual design, design process, person-environment relations, experiential notation.

Vernez Moudon, Anne * 1980; DSc, 1987, Ecole Polytechnique Federale de Lausanne (Switzerland); urban design, city form and neighborhood studies, design research.

Zarina, Astra * 1970; MArch, 1955, University of Massachusetts; design, foreign studies.

Associate Professors

Albrecht, Robert G. * 1960; MSCE, 1960, University of Massachusetts; structures.

Bentli, Kwaku K. * 1991, (Adjunct); PhD, 1990, University of Florida; project management, safety, robotics, affordable housing, construction site waste and recycling.

Curtis, J. William * 1962, (Emeritus); MA, 1969, University of Washington; design process, professional studies.

Deines, Katrina * 1985; MA, 1975, University of Minnesota; MArch, 1979, University of Washington; design theory and foreign studies, history.

Donnette, James J. * 1966; MArch, 1969, University of Washington; graphics, design.

Dubrow, Gail Lee * 1989, (Adjunct); MA, 1979, University of Oregon; PhD, 1991, University of California (Los Angeles).

Goldblatt, Steven M. 1982, (Adjunct); JD, 1977, Golden Gate University; construction accounting, labor relations, and construction law.

Heerwagen, Dean Reese * 1975; MS, 1967, University of Massachusetts; environmental controls (passive and active).

Hill, Warren * 1959, (Emeritus); MA, 1961, New York University; interior design, design, history.

Kasprisin, Ronald J. * 1989, (Adjunct); MUP, 1968, University of Washington; community design studios, town planning, planning/design communications, urban design principles.

La Tourelle, Elaine Day * 1975; MArch, 1964, Yale University; design, professional practice.

Lebert, Edgar A. 1965; MS, 1967, University of Washington; structures.

Loveland, Joel E. * 1986; MArch, 1980, University of California (Los Angeles); energy conservation, design, research.

Miller, David E. * 1989; MArch, 1972, University of Illinois; design development, design.

Millet, Marietta * 1976; MArch, 1972, Massachusetts Institute of Technology; illumination, environmental controls.

Minah, Galen F. * 1970; MArch, 1968, University of Pennsylvania; design process, design, professional practice.

Mohler, Richard Ernest J. * 1986; MArch, 1984, University of Pennsylvania; architecture and community, design of housing and urban public open space.

Norton, Thomas J. * 1968, (Emeritus); MUP, 1960, University of Washington; urban community facilities, planning administration.

Ochsner, Jeffrey K. * 1987; MArch, 1976, Rice University; history, preservation design, urban design.

Rohrer, John * 1948, (Emeritus); BArch, 1937, University of Washington; graphics, design.

Rolfe, George R. * 1984, (Adjunct); MArch, 1968, MCP, 1968, University of Pennsylvania; urban development process, finance, feasibility and market analysis, urban design processes.

Rosner, Arnold S. * 1966, (Emeritus); MSCE, 1949, California Institute of Technology; design process, building technology, computers.

Ryan, Dennis M. * 1974; PhD, 1976, University of Pennsylvania; community planning, design, and identity; public processes; urban design, change, and continuity.

Sasanoff, Robert * 1963; MCP, 1968, University of California (Berkeley); design process, person-environment relations.

Assistant Professors

Heerwagen, Judith * 1981, (Research); PhD, 1982, University of Washington; behavioral ecology.

Palleroni, Sergio A. * 1992; MS, 1987, Massachusetts Institute of Technology; the relationship between cultures, their histories, and the production of architecture.

Senior Lecturers

Onouye, Barry S. * 1967; MSCE, 1969, University of Washington; integration of structural technology into architectural design education.

Vanags, Andris 1969; BFA, 1968, University of Washington; building science, design.

Zuberbuhler, Douglas * 1967; MArch, 1968, University of Washington; graphics, design, building technology.

Lecturers

Dee, Jennifer 1982; MArch, 1984, University of Washington; theory, design.

Johnson, Brian Robert 1978; MArch, 1981, University of Washington; computer applications.

Lawrence, J. Gary 1994; MPA, 1976, University of Georgia.

Nicholls, James Keith 1995; BArch, 1986, University of British Columbia (Canada); design, industrial design, construction technology.

Courses for Undergraduates

ARCH 150, 151 Appreciation of Architecture I, II (2/3, 2/3) VLPA *Bosworth, Deines* Historical survey of the architecture of Western civilization. For nonmajors.

ARCH 200 Introduction to Environmental Design and Planning (3) VLPA/I&S Lectures, demonstrations introducing basic curricular elements. Development of basic skills in methods and graphic expression of design and planning process-analysis, synthesis, evaluation in building technology; simulation, modeling; person-environment relations; history; theory; policy; professional roles. Prerequisites: ENV S 203 and 205 or permission of program director.

ARCH 210 Design Drawing I (4) VLPA *Ching* Projects, lectures, demonstrations, and exercises to develop skill in freehand drawing and an understanding of drawing as a vital means to see, analyze, and represent essential aspects of the visual environment.

ARCH 211 Design Drawing II (4) VLPA *Ching* Projects, lectures, demonstrations, and exercises to introduce the language of architectural drawing, with emphasis on freehand drawing as the primary means to imagine, explore, and develop design ideas.

ARCH 250 American Architecture and Urban Environments (2) VLPA *Pundt* Study and critical investigation of architecture and the problems of urban design in North America from colonial times to the present. For nonmajors.

ARCH 300, 301, 302 Introduction to Architectural Design I, II, III (6, 6, 6) Studio problems to develop awareness, knowledge, and basic skills needed in the synthesis of building form. Concurrent registration in 315 required for 300. Prerequisite: architecture major.

ARCH 303-304-305 Introduction to Design Studio I, II, III (6-6-6) Studio problems to develop initial awareness, knowledge, and basic skills needed in synthesis of building form and integrative aspects of architectural design with emphasis on the dwelling place. Limited to students entering the graduate program in architecture with baccalaureate degrees in other fields. Prerequisite: first-year student standing in three-year Master of Architecture program.

ARCH 310, 311, 312 Architectural Design Drawing I, II, III (3, 3, 3) Lectures, demonstrations, and exercises to develop skill in graphic visualization and representation as used in architecture. Concepts, conventions, and techniques of both freehand and technical drawing are used as a vital means to imagine, develop, and represent design ideas. Course material coordinated with 303, 304, 305 studios to integrate drawing in all phases of the design process. Prerequisite: first-year student standing in three-year Master of Architecture program.

ARCH 313 Introduction to Architectural Photography (3) VLPA Basic elements and processes of architectural photography to include camera controls, exposure technique, photo processing, and fundamental principles of photographing architecture. Student must provide own 35 mm (or larger) camera with manual operating controls.

ARCH 314 Introduction to Architectural Drawing (2) Skill development in conceptualization of forms and their relationships through observation and recording in freehand graphic manner. Proportion, scales, light effect, value, texture, and various perspective techniques.

ARCH 315 Design Drawing III (2) Projects, lectures, demonstrations, and exercises coordinated with studio projects to integrate drawing in all phases of the design process. Lessons in diagramming of design concepts and planning and presenting design solutions. Concurrent registration in 300 required. Prerequisites: 211.

ARCH 320 Introduction to Structures I (3) *Lebert, Onouye* Statics and strength of materials.

ARCH 321 Introduction to Structures II (3) Design of structural elements in timber and steel.

ARCH 322 Introduction to Structures III (3) Building framing systems; wind and seismic loads, long-span structures.

ARCH 331 Environmental Control Systems (3) NW *Heerwagen, Loveland* Description of thermal comfort needs and the means by which buildings can be designed to satisfy those needs. Consideration of how climate determines building forms, site analysis and planning vis-a-vis the local climate, basic heat transfer mechanisms, and design strategies for overcoming heat loss through the building envelope.

ARCH 332 Construction Materials and Assemblies I (3) Lectures and readings pertaining to a survey of residential and light-commercial construction materials, assemblies, and techniques of assembly.

ARCH 340 People-Environment Interactions (3) I&S Lecture and discussion on the dynamics of people-environment interactions. A spectrum of environmental scales and cultural contexts addressed. Builds on the theoretical and empirical work in the field and relates to studio design work in 303.

ARCH 350 Architecture of the Ancient World (3) VLPA *Bosworth* Architectural history in the Western world from beginnings to AD 550.

ARCH 351 Romanesque, Gothic, and Renaissance Architecture (3) VLPA *Hildebrand* Architectural history in the Western world from AD 550 to 1750.

ARCH 352 History of Modern Architecture (3) VLPA *Ochsner* Architectural history in the Western world from 1750 to the present.

ARCH 360 Introduction to Architectural Theory (3) VLPA/I&S Function of architectural theory in comprehending and ordering various human purposes in architecture, types of architectural purpose, and types of theories. Current concerns.

ARCH 370 Computers in Architecture (3) Laboratories, lecture, and demonstrations to introduce computing in environmental design and planning. Prerequisite: ENV S 203 and 205 or permission of program director.

ARCH 400, 401 Architectural Design IV, V (6, 6) Offers studio problems in non-residential building design to advance student's understanding of the ideas and technologies of architecture. Prerequisite: 302.

ARCH 402 Architectural Design VI (6) Selection of studio sections that introduce advanced architectural design theories and methods. Focus and format vary. Prerequisite: 401.

ARCH 403 Architectural Problems (6)

ARCH 411 Computer Graphics Applications (3) *Johnson* Lectures and weekly exercises focus on understanding and applying the underlying principles of 3D computer graphics and rendering software. Topics include user-interface, data creation and modeling, lighting models, smoothing, texture mapping, ray tracing, radiosity, animation, and solid modeling. Prerequisite: 370 or permission of instructor.

ARCH 412 Architectural Illustration and Presentation (3) Issues, conventions, and techniques used in architectural renderings, including line drawings, shaded drawings, use of color, composition, organization, advanced perspective, scale figures, entourage, reflections, and media. Prerequisite: 311.

ARCH 413 Architectural Photography Projects (3) Students develop in-depth photo essays relating to architecture, the urban movement, or landscape design following the principles introduced in ARCH 313. Lectures, seminar, and discussion. Prerequisite: 313.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

ARCH 415 Architectural Sketching (3) Exercises in freehand representational drawing using charcoal, graphite, and conte crayon with emphasis on line, proportion, values, and composition. Studies progress from geometric to nongeometric forms.

ARCH 418 Watercolor Drawing (3) Introduction to the principles and practice of using transparent watercolor for the naturalistic representation of objects, people, and interior and exterior space.

ARCH 420 Structural Design I (4) Reinforced concrete fundamentals. Prerequisite: 322.

ARCH 421 Structural Design II (4) Design of steel structures.

ARCH 422 Structural Design III (4) Design of reinforced concrete structures.

ARCH 426 Structural Unit Masonry (3) *Lebert* Structural behavior and design of reinforced brick, tile, and unit masonry structures. Offered: jointly with CIVE 455.

ARCH 430 Materials and Processes (3) *Vanags* Lectures, field trips, and laboratory sessions directed toward the nature, potentials, and limitations of a variety of materials (wood, metal, plastics, inorganic cementing materials, minerals, rocks, and clay) and the processes involved with their production, fabrication, and system compatibility.

ARCH 432 Construction Materials and Assemblies II (3) *Schneider* Lectures and readings pertaining to a survey of materials, assemblies, and techniques of assembly of concrete and steel frame, commercial exterior envelope, and interior partitioning building construction systems. Prerequisite: 332.

ARCH 433 Active Control Systems for Building Operation (3) *NW Heerwagen* Electrical, mechanical (HVAC), plumbing, and fire safety systems for buildings. Descriptions of what these systems do, where they are used, how they are integrated into the overall building design; rules of thumb, design strategies, and short cuts for anticipating system design and use. Prerequisite: 331.

ARCH 434 Color and Light (3) *Millet* Lectures, demonstrations, exercises, and projects focusing on the use of color applied to the three-dimensional architectural context. Color theory is explored with the multiple effects of changing light.

ARCH 435 Principles and Practices of Environmental Lighting (3) *Millet* Perception-based approach to principles of natural and artificial lighting. Practical considerations of lighting involving environmental evaluations, calculations and the use of lamps and fixtures. Sketch and model studies for applications. Impact of lighting design on energy conservation. Relation of lighting design process to architectural design concepts. Prerequisite: 331.

ARCH 436 Building Acoustics (3) *NW Heerwagen* Description of principles and practices for manipulating and enhancing sound in buildings. Information about sound behavior and the organization of architectural elements (deployment of design features, including various geometries and materials) for the control of sound in enclosed spaces and between adjacent spaces.

ARCH 437 Passive Thermal Controls (3) *NW Heerwagen* Devices for achieving energy-efficient buildings, analytic methods for evaluating likely thermal performances of buildings and building envelopes, resistance and capacitance of building materials, air flow through and around buildings, energy codes and industry standards, and strategies for integrating analytic techniques and guidelines into the architectural design process. Prerequisite: 331.

ARCH 439 Light Frame Building Assemblies (3) *Vanags* Fundamentals of light-frame construction from soils examination, foundation systems to framing

systems, and the integration of electrical, plumbing, and heating/cooling into the structure. Prerequisite: College of Architecture and Urban Planning major or permission of instructor.

ARCH 447 Physical Structure and Human Interaction (3) *I&S Kiyak* Effect of physical structure on human interaction.

ARCH 451 Traditional Chinese Architecture (3) *VLPA/I&S* Introduction to Chinese architecture (palaces, homes, temples, tombs), urban planning, and gardens; each area examined in terms of techniques of production, visual styles, historical development, and relationship to traditional Chinese cultural values. Offered: jointly with ART H 411.

ARCH 452 Characteristics of Puget Sound Architecture and Towns (3) *I&S Hildebrand* Puget Sound architectural and town environment in terms of its historical development, but specifically including recent and pending changes affecting this environment in significant ways.

ARCH 453 Japanese Architecture (3) *VLPA* Survey of Japanese architecture from its origins to modern times. Although Shinto architecture, tea houses, gardens, and modern developments are discussed, the primary focus is on the development of Japanese Buddhist architecture. Offered: jointly with ART H 419.

ARCH 454 Greek Architecture (3) *VLPA Langdon* Detailed study of Greek architecture from its beginnings, with special emphasis on the Periclean building program in fifth-century Athens. Offered: jointly with ART H and CL AR 446.

ARCH 455 Special Studies in Gothic Art and Architecture (3) *VLPA Hildebrand* Detailed study of Gothic architecture and its accompanying sculpture and stained glass, with special emphasis on the twelfth and thirteenth centuries in France and England. Offered: jointly with ART H 455.

ARCH 456 Nineteenth-Century Architecture (3) *VLPA* From late eighteenth-century French rationalists, Neoclassicists, to fin de siècle Vienna and Paris. Includes theorists such as Ruskin, Viollet-le-Duc, and Semper; major movements, such as the Arts & Crafts, and the French Ecole des Beaux-Arts method of design. Prerequisite: some background in architectural history. Offered jointly with ART H 490.

ARCH 457 Twentieth-Century Architecture (3) *VLPA* Architecture in the twentieth-century, mainly in Europe and the United States. Traces roots of Modernism in Europe in the 1920's, its demise (largely in the United States) in the 1960's and recent trends such as Post-Modernism and Deconstructivism. Prerequisite: some background in architectural history. Offered jointly with ART H 491.

ARCH 459 Architecture Since 1945 (3) *VLPA* Theories and forms in architecture from the end of World War II to present. Includes new wave Japanese architects, recent Native American developments, and non-Western as well as Western trends. Prerequisite: some background in architectural history. Offered: jointly with ART H 493.

ARCH 460 Design Theory and Analysis (3) *VLPA/I&S Dee, Minah, Seligmann* Problematical nature of philosophies of architecture; interaction of philosophical concepts and architectural form and expression. Fundamentals of architectural criticism.

ARCH 461 Recent Developments in Architectural Theory (3) *VLPA/I&S* Concentrates particularly on developments that spring from recent work in the epistemology of science and in philosophy.

ARCH 476 Design and the Uniform Building Code (3) Lectures, case studies, and exercises to provide a detailed review of non-structural sections of the Uniform Building Code (UBC) including designer responsibility, code background, purpose, and requirements

based on occupancy, construction type, and building design features.

ARCH 478 Architectural Computer Aided Design Systems (4) *Johnson* Lectures and exercises in use of two-dimensional CAD as a tool to create working drawings (WD). CAD topics include data, accuracy, layering, symbols, 3D, customization, data exchange. WD topics include set organization, plans, building sections, elevation, wall sections, schedule, detail. Prerequisites: 370 or permission of instructor.

ARCH 488 American Architecture (3) *VLPA Clausen* American architecture from indigenous native American traditions to the present. Prerequisite: some background in architectural history. Offered: jointly with ART H 488.

ARCH 493 Rome Preparation Seminar (2) Seminar dealing with history, culture, topography, and customs of Rome, Italy. Required for students enrolling in 495, 496, or 497.

ARCH 495 Architectural Studies Abroad (9) Urban history and development of the city of Rome through first-hand studies of its topography and morphology. City's more recent quarters become subject of group research relative to problems and potentials of growth and future development. Students may be registered concurrently in an appropriate studio section. Prerequisite: 493.

ARCH 496 Architectural Studies Abroad (9) Studio-oriented projects and application of experience gained during preceding program. Seminars held in collaboration with Italian students, professionals, and educators. Prerequisite: 495.

ARCH 497 Italian Hilltowns (9) *I&S Zarina* Introduction to origins and development of built forms prevalent in the hilltowns of central Italy, a comparative analysis of domestic architecture in the agricultural context of the confluence zone of Tuscany, Umbria, and Latium and a historical survey of fortresses, castles, palaces, villas, and gardens of upper Latium. Prerequisite: 493.

ARCH 498 Special Projects (1-12) Instructor-initiated and department-approved systematic study and offering of specialized subject matter. Topics vary and are announced in preceding quarter.

ARCH 499 Undergraduate Research (1-6)

Courses for Graduates Only

ARCH 500-501-502 Architectural Design Studio (6-6-6) Architectural design, with emphasis on development of professional skills in design synthesis. Specific focus on preservation design (500), urban design (501), and design development (502). Majors only.

ARCH 503-504-505 Architectural Design Studio Options (6-6-6) Advanced architectural studios in general architectural design, in special projects examining particular architectural determinants, and in architectural research. Focus and format vary with instructor. Prerequisite: 502.

ARCH 506 Advanced Architectural Studies (6) Advanced experimental studies dealing with significant architectural relationships that involve scholarly investigation, development, and presentation of results.

ARCH 520 Advanced Wood Structures Design (3) *Aibrecht* Design methods related to wood structures. Nature of wood as a building material, plywood, glued laminated wood structures, timber piles and pile foundations, pole buildings, and conventional wood building framing.

ARCH 529 Seminar in American Architecture (6) *Clausen* Topics vary. Offered: jointly with ART H 592.

ARCH 535 Graduate Seminar, Study Topics in Environmental Lighting (3) *Millet* Focus on individual

student projects involving research and design for lighting.

ARCH 540 Evolution and Aesthetics (2) *Hildebrand* Exploration of new views toward the theory and philosophy of architectural aesthetics in which responses are seen as driven, in part, by predilections contributive to biological survival and evolution.

ARCH 551 Scandinavian Architecture of the Nineteenth and Twentieth Centuries (3) *Nyberg* Introduction to the contribution of Scandinavian architecture to early functionalism with emphasis on its relationship to neoclassicism and vernacular architecture.

ARCH 553 Special Studies in Architecture in the Ancient World (3) *Bosworth* Study and critical analysis of a selected topic from classical or preclassical periods. Prerequisite: 350.

ARCH 554 Special Studies in Modern Architecture (3) *Pundt* Study and critical analysis of a selected number of distinguished professionals (architects, planners, educators, critics) and their contributions to the evolution of modern and contemporary architectural practice and thought.

ARCH 556 History of Chicago School Architecture (3) *Pundt* Study and critical investigation of the contribution of major architects in Chicago, the Midwest, and the West Coast from circa 1870 to 1920.

ARCH 557 Neoclassicism and Romanticism in Europe and America (3) *Pundt* Study and critical investigation of European and American architecture and urban design from 1750 to 1850.

ARCH 558 Seminar in Twentieth-Century Architecture (3/5) *Clausen* Specific focus changes from quarter to quarter. Prerequisite: graduate standing with background in architecture, architectural history, or permission of instructor. Offered: jointly with ART H 591.

ARCH 559 American Utilitarian Architecture (3) *Hildebrand* Significant American environmental design efforts arising from utilitarian needs, e.g., factories, bridges, skyscrapers, and associated technical building innovations.

ARCH 560 Graduate Seminar on Architectural Theories (3) *Dee, Nyberg, Seligmann* Recent developments in architectural theory, urban design theory, criticism, and the methodology of criticism.

ARCH 561 Urban Design Theory (3) Study of development of nineteenth- and twentieth-century urban design theories and parallel developments in architecture and urban planning. Theoretical premises are related to current practices of urban design in various sociopolitical contexts, European as well as American. Evolutionary nature of theory emphasized. Prerequisite: URBDP 479 or permission of instructor.

ARCH 562 Regionalism (3) *Nyberg* Exploration of design ideas that address the cultivation of regional character by acknowledging the commonplace, including both the landscape and its buildings. The many disruptive forces that threaten the possibilities of local culture are also considered from a political, social, and economic point of view.

ARCH 570 Design Development (3) *Miller* Lectures and case studies emphasizing the design development phase of architectural practice.

ARCH 571 Project Feasibility (3) *Wright* Social, political, and economic factors affecting the location, design, financing, construction, and marketing of buildings.

ARCH 572 Specifications and Contracts (3) *Brown* Detailed organization and composition of contracts, specifications, and related contract documents.

ARCH 573 Professional Practice (3) *Fees* Operation of an architectural office and professional practice.

ARCH 574 Law for Architects and Engineers (3) *Goldblatt* Legal issues facing architects and engineers, focusing on liability avoidance. Topical areas include basic doctrines, the design professional/client relationship, the construction process, and professional practice problems.

ARCH 581 Historic Preservation of Architecture, USA (3) *Pundt* American achievements in historic preservation and restoration of architecture. Prerequisite: specialization in preservation design or permission of instructor.

ARCH 582 Technical Issues in Preservation Design (3) *Sivinski* Issues, practices, and procedures involved in preservation and reuse of old and historic buildings. Technical and esthetic means by which practicing professionals approach the analysis, interpretation, and resolution of problems such work raises. Emphasis on recent and local projects and related experiences.

ARCH 583 History of Historic Preservation in Europe (3) *Pundt* European achievements in historic preservation and restoration of architecture. Prerequisite: specialization in preservation design or permission of instructor.

ARCH 590 Urban Issues in Design (3) Theory and practice of urban design, primarily in North American settings. Lecture and readings in recent design theory and case studies of recent urban projects at a variety of scales.

ARCH 593 Residential Design: Methods and Practices (3) Review of approaches to housing people in growing metropolises and cities, nineteenth century to present. Emphasis on Western Europe, North and South America. Focus on selected contemporary issues in neighborhood and dwelling design, methods, and practices. Offered: jointly with URBDP 574.

ARCH 596 Fieldwork in Professional Practice (* max. 9) On-location study under the supervision of a practicing professional involved in an aspect of environmental design. Credit/no credit only.

ARCH 598 Special Topics for Graduate Students (1-6) Systematic study and offering of specialized subject matter. Topics vary and are announced in the preceding quarter. May be repeated for credit.

ARCH 600 Independent Study or Research (*) Credit/no credit only.

ARCH 700 Masters Thesis (*) Credit/no credit only.

Building Construction

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The construction industry requires highly qualified professionals to manage its increasingly complex technical and management operations. The Department of Building Construction offers high quality education and training to meet this demand. The interdisciplinary curriculums contain a mix of technical, managerial, and business courses to provide graduates with the essential skills needed to be successful in the construction industry. Oral and written communication skills are strengthened through written requirements and student presentations.

Building Construction is one of four departments within the College of Architecture and Urban Planning. The department was originally established as a Building Technology and Administration program in 1964; it began offering a Bachelor of Science in Building Construction degree in 1968 and a Master of Science in

Construction Management degree in 1994. The mission of the Department of Building Construction is to offer a high quality education in building construction and to conduct construction-related research.

The major objectives of the department's educational programs are:

1. Provide a valuable education that can prepare individuals to assume technical and management level positions in the construction industry.
2. Serve society and the construction industry by graduating students who can obtain employment in the construction or related industries.
3. Provide a learning environment where students can acquire the technical skills and knowledge necessary for solving practical construction problems and managing the construction process.
4. Remain in full accreditation status by the American Council for Construction Education.
5. Ensure that the construction and related industries who employ graduates of the programs are satisfied with their performance.

Emphasis is on course work that enables graduates to develop: (1) technical skills necessary to define and solve practical construction problems; (2) self-discipline, analytical and reasoning skills; (3) managerial skills necessary to make and implement sound and timely decisions in a prudent and professional manner; (4) broader perspectives of the humanities and social and natural sciences; and (5) the ability to effectively communicate verbally and in writing.

Graduates of the programs can find entry-level management or supervisory positions throughout the country with private construction firms (general and specialty contractors), public agencies, or can establish their own firms after acquiring the appropriate expertise in industry.

The department's faculty consists of a mix of permanent full-time professors and part-time lecturers. The full-time faculty members have prior construction industry experience. The part-time lecturers are mostly industry practitioners and include general contractors, specialty contractors, architects, engineers, attorneys, and others.

Undergraduate Program

Bachelor of Science in Building Construction

The undergraduate program in building construction provides the knowledge and skills to prepare graduates for entry-level supervisory or managerial positions in the construction industry. When course work is combined with work experience, graduates find employment as construction estimators, superintendents, project managers, construction managers, or in founding their own firms.

Because the number of applicants is large and the department's resources are limited, the process of admission is very selective. Admission decisions are based on an applicant's academic performance and potential, extent and quality of relevant experience, apparent aptitude, and personal motivation.

The core curriculum is concentrated in the upper division during a typical student's junior and senior years. The first two years can be completed at the UW (or other four-year institutions) as a premajor in the College of Arts and Sciences or at a community college.

Admission Requirements: Applicants must contact the department to obtain its individual application form and prospectus, which contain details of requirements for admission. Closing date for receipt of applications by the department is April 1; however, the UW admissions

application form and its accompanying material must be filed separately at the Office of Admissions much earlier than the department's closing date. Selection for acceptance into the program, which begins autumn quarter, is made each year by early May, and all applicants are notified of the admissions committee's decision shortly thereafter. Because each application is valid only once, a student whose application for admission is denied must reapply if consideration is desired in any subsequent year. Preference is given to those applicants who have successfully completed the lower-division requirements (prerequisites), and who are, in the judgment of the department, best qualified and prepared to undertake its curriculum. The department strongly urges ethnic minorities and women to apply for admission.

In order to meet the lower division requirements, the program requires the satisfactory completion of a minimum of 90 credits of course work in the following categories (courses should be completed by prospective applicants prior to applying for admission to the department, and must be completed by the beginning of the autumn quarter to be eligible for admission): *Construction Sciences*: F E 340 (4 credits); ENGR 123 (4); *Business and Management*: ACCTG 210 (3); ACCTG 220 (3); O E 200 (5); *Individuals and Societies* (I & S): ECON 100, 200, or 201 (5); 6 additional I & S credits (from UW Areas of Knowledge list). *Natural World (NW)*: PHYS 114, 117 (5); PHYS 115, 118 (5); MATH 111 or 120 (5); MATH 112 or 124 (5); GEOL 101 (5); QMETH 201 (4); 5 additional NW credits (chemistry recommended). *Language Skills*: ENGL 111, 131, 197, 198, 199, or 251 (10); *Visual Literary & Performing Arts (VLPA)*: SP CMU 220 (5); 6 additional VLPA credits (from UW Areas of Knowledge list). *Computer Skills*: Introduction to Microcomputers course which must be taken at a community college (5 credits).

Graduation Requirements: The Bachelor of Science in Building Construction degree program requires completion of the four-year curriculum with (1) a minimum of 181 approved credits including 15 credits of upper-division business courses, (2) a minimum 2.50 cumulative GPA in required upper-division core courses, and (3) a minimum 2.30 cumulative GPA in a student's final six quarters. The last 45 credits must be earned as a matriculated student in residence at the UW. Consult the departmental prospectus for details.

Internship: An internship is required for completion of the degree program. Every student is encouraged to seek summer employment in the construction industry. The main objective is to provide students with a taste of "real-world" experience by giving them the opportunity to work at a construction site or in a construction firm's office, and exposing them to as many facets of the construction process as possible. Monetary compensation, if any, is negotiated between the student and the employer. While the department makes every effort (through a selection and interview process) to place students in a number of unfilled positions usually offered by participating firms, most students seek internships on their own initiative during the winter and spring quarters of their junior year. Students participating in the summer internship program register for B CON 412 for the following autumn quarter and acquire three upper-division credits upon completion of the summer internship, submission of a required written report, attendance in class during autumn quarter, and an oral class presentation.

Dual-Degree Program: The Department of Building Construction, in conjunction with the Department of Architecture, offers a five-year dual-degree program to provide students education in both the design and construction disciplines. Students must consult an adviser and concurrently apply to both the Departments of Architecture and Building Construction at the end of their second year of study to gain entry into the program. The five-year curriculum is a blending of the Architecture and Building Construction programs. Graduates of the dual-degree program receive both a Bachelor of Science in Building Construction degree and a Bachelor of Arts degree in Architectural Studies.

Students interested in the dual-degree program are encouraged to consult undergraduate advisers in both departments.

Graduate Program

Master of Science in Construction Management

The Evening Master of Science in Construction Management degree program makes high-quality graduate education accessible to working professionals. All graduate courses are offered during the evening to accommodate people who work during the day. The curriculum was developed with industry input to provide graduates with the skills desired by the construction industry. The graduate curriculum has been structured to build upon the educational foundation gained in an undergraduate building construction or construction management curriculum. Students with different educational backgrounds will need to take prerequisite courses, as discussed later. Admission is competitive, and students are admitted in autumn, winter, and spring quarters. Applications must be submitted by July 1 for autumn quarter, November 1 for winter quarter, and February 1 for spring quarter.

Admission Requirements: Admission to the Graduate School is granted by the Dean of the Graduate School. Application for admission is made to the Office of Graduate Admissions. The prospective student must hold a baccalaureate degree from an accredited college or university in the United States or its equivalent from a foreign institution. The applicant must submit a completed UW graduate application form and official transcripts from all previously attended colleges, universities, and institutes. A prospective student must present recent scores (within the past five years) from the Graduate Record Examination (GRE) that indicates a potential for successful completion of a Master of Science in Construction Management degree. The applicant should have at least a 3.00 GPA in the last 90 graded quarter hours, or last 60 graded semester hours. International applicants should refer to the Graduate School section of this catalog for English language testing requirements. In addition, the Department of Building Construction requires a statement of personal goals and three letters of reference. All applications are reviewed by the department's Graduate Admissions Committee who make a recommendation regarding each applicant to the Dean of the Graduate School.

Prerequisite Requirements: All students admitted to the program who do not possess an undergraduate degree in building construction or construction management must complete the following prerequisite courses prior to admission into the graduate program or during their graduate studies: B CON 333, 410, 411, 421, 422. All these prerequisite courses are offered during the day on a space-available basis with undergraduate students, or during the evening in the Construction Management Certificate Program offered by UW Extension. Three of the 400-level prerequisites may be counted toward elective requirements, if the student has been admitted to the graduate program prior to taking the prerequisites.

All students who do not have undergraduate degrees in building construction, construction management, engineering, or architecture must take the following prerequisites in addition to those previously listed: ARCH 320, 321, 322; B CON 310, 313, 320, 321, 322, 323, 331, 332. Most of these prerequisites must be completed prior to admission into the graduate program.

Prerequisite courses may be validated if similar courses are reflected on the student's undergraduate transcript or if the student desires to take a validation examination. Students desiring to take a validation examination should contact the department's Graduate Program Coordinator.

Graduation Requirements: The Master of Science in Construction Management degree program requires completion of a minimum of 45 credits of course work with at least a 3.00 cumulative GPA and satisfactory completion of either a thesis or report/project. A maximum of 6 credits may be earned for a report/project, and a maximum of 9 credits may be earned for a thesis.

Financial Aid

The department has information regarding undergraduate scholarships available for juniors enrolled in the Building Construction program. Some scholarships are administered by the department, while others are administered by professional organizations and private firms in the construction industry.

Computer Facilities

The department uses a state-of-the-art computer laboratory that is located on the second floor of Gould Hall. This laboratory contains 26 networked IBM-compatible computers that contain current construction management software. Students are encouraged to use the facility to supplement their classroom instruction.

Correspondence and Information

116 Architecture, Box 351610

Faculty

Chair

Kweku K. Bentil

Professor

Hinze, Jimmie W. * 1984, (Adjunct); PhD, 1976, Stanford University; construction engineering and management.

Associate Professors

Bentil, Kweku K. * 1991; PhD, 1990, University of Florida; project management, safety, robotics, affordable housing, construction site waste and recycling.

Donnette, James J. * 1966; MArch, 1969, University of Washington; graphics, design.

Goldblatt, Steven M. 1982; JD, 1977, Golden Gate University; construction accounting, labor relations, and construction law.

Rolle, George R. * 1984; MArch, 1968, MCP, 1968, University of Pennsylvania; urban development process, finance, feasibility and market analysis, urban design processes.

Torrence, Gerard R. 1954, (Emeritus); MS, 1950, Massachusetts Institute of Technology; structures.

Assistant Professors

Fredley, John P. 1992; MSBC, 1992, University of Florida; computer applications, estimating, scheduling, construction methods.

Pace, Clark B. 1994, (Acting); MS, 1989, Colorado State University; MEng, 1991, University of California (Berkeley); productivity improvement, innovative affordable housing, process of new technology development.

Riley, David R. 1995; PhD, 1994, Pennsylvania State University; planning and managing space for construction work, digital image databases, multimedia teaching aids.

Schaufelberger, John E. 1994; MSCE, 1970, PhD, 1971, University of Illinois; construction practices, international project management, contract procurement and administration.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

B CON 310 Introduction to the Construction Industry (3) *Bentil* Introduction to the construction process, including general overview of organization, relationships, practices, terminology, project types, procurement methods, industry standards, contract documents, and career opportunities. Open to nonmajors on space-available basis. Offered: AS

B CON 312 Construction Accounting (3) *Goldblatt* Introduction to accounting for the contractor, placing emphasis on the analysis and use of financial statements and a job cost accounting system. Open to nonmajors on space-available basis. Offered: A.

B CON 313 Construction Methods and Materials I (4) *Riley* Review of basic building materials, with emphasis on techniques for assembly and utilization in residential and light construction, including materials such as concrete, brick, and wood. Offered: AS.

B CON 320 Construction Contract Documents (3) *Vrable* Introduction to working drawings, specifications, and other documents designed to enable the student to read and interpret complete set of contract documents for residential and light commercial projects. Emphasis on the organization and uses of architectural/engineering drawings and specifications in the construction process. Prerequisites: ENGR 123 or equivalent. Offered: WS.

B CON 321 Building Technology I (3) *Kommers* Introduction to building heating, cooling, plumbing, and fire protection systems including aspects of design, construction, estimating, and problem solving. Prerequisites: PHYS 115, 118. Offered: W.

B CON 322 Building Technology II (3) *Gutkunst* Introduction to electrical construction including electrical distribution from generation to consumption, terminology, equipment and applications, electrical contract documents and estimating, and electrical project management theory and practice. Offered: W.

B CON 323 Construction Methods and Materials II (5) *Riley* Analysis of building methods for structural, non-structural, and design and use of temporary structures including method selection, sequencing, and coordination of specialty trades in commercial and industrial construction. Offered: W.

B CON 331 Construction Estimating I (4) *Pace* Introduction to the basic principles and techniques of quantity take-off and estimating with emphasis on residential construction. Offered: Sp.

B CON 332 Construction Equipment Management (3) *Schaeffelberger* Study of the basic principles, practices, and techniques used in the construction industry for selecting and managing construction equipment. Focuses on understanding the time value of money, estimating equipment ownership and operating costs, selecting the proper equipment for specific construction tasks, and estimating equipment production. Offered: Sp.

B CON 333 Construction Safety (3) *Bentil* Explanation of requirements of the Occupational Safety and Health Act and other related federal and state legislation as applied to the building construction industry. Standards for accident prevention and responsibility for compliance emphasized. Offered: Sp.

B CON 350 History of Building (3) *Rolfe* Historical survey of building techniques and materials as conditioned by environment, technical, economic, and social influences. Open to nonmajors. Offered: A.

B CON 410 Construction Estimating II (4) *Fredley* Principles and techniques for the estimating of commercial construction projects including a mock bid day exercise on a commercial construction project. Prerequisite: 331. Offered: A.

B CON 411 Project Planning and Control (3) *Pace* Introduction to the basic principles, techniques, and practices used as tools by contractors to plan and schedule building construction projects. Prerequisites: 310, 313, 320, 321, 322, 331, and 332 or equivalent or permission of department. Offered: A.

B CON 412 Construction Practice (3) *Bentil* Integration of classroom theory with practical experience through a direct, on-the-job internship and industry guest speakers. For majors in building construction with 135 credits completed. Offered: A.

B CON 421 Project Management I (3) *Bentil* Introduction to the organization, management, and administrative functions on construction projects including a hands-on and extensive case study of a commercial construction project, cost control, and introduction to the concepts of Value Engineering, partnering, and Total Quality Management. Prerequisites: 312, 410, 411, and 412. Offered: W.

B CON 422 Computer Applications in Construction (3) *Fredley* Introduction to microcomputer applications in construction industry. Discussion of available hardware and software is combined with practical assignments using estimating and scheduling programs designed for contractors, architects, and developers. Prerequisites: 312, 331, 410, 411, 412, 421 and graduating senior. Offered: W.

B CON 432 Soils and Foundations (3) *Twelker* Origin, classification, and physical properties of soil as used in engineering and construction applications, together with loads and stresses of soil on, and from, the more common types of engineering structures. Prerequisites: GEOL 101, ARCH 320, 321, 322, and 420. Offered: Sp.

B CON 498 Special Topics (1-10, max. 20)

B CON 499 Undergraduate Research (* max. 12) Individual or small-group studies in which students may select topics with approval of faculty sponsor and department.

Courses for Graduates Only

B CON 505 Advanced Integrated Computer Applications (3) *Fredley* Study of management information systems used in the construction industry. Emphasis on the utilization of current state-of-the-art computer hardware and software and the integration of Computer Aided Design (CAD), scheduling, and estimating techniques. Offered: SpS.

B CON 510 Advanced Construction Techniques (3) *Riley* Study of techniques and practices used in complex construction projects, including industrial and high-rise structures, building renovation, and tenant improvements. Offered: A.

B CON 515 Innovative Project Management Concepts (3) *Bentil* Study of innovative concepts and trends in project management such as partnering, construction automation, and their application to construction projects. Total Quality Management, effective communication principles, leadership and team building, and robotics also examined. Offered: Sp.

B CON 520 Construction Procurement Systems (3) *Schaeffelberger* Study of the different methods used in the procurement and delivery of projects in the construction industry including lump sum, unit price, cost-plus, design-build, and construction management contracts. Offered: A.

B CON 525 Cost Analysis and Management (3) *Pace* Study of cost management procedures applicable to the building process from the conceptual

phase through owner operations, including conceptual estimating, project cost analysis and control, and value engineering and life-cycle costing. Offered: W.

B CON 550 Residential Project Development (3) *Rolfe* Study of the financial, technical, and management activities and environmental impact regulations and studies associated with the development of residential projects, including business and construction practices and marketing strategies for continued profitable operation of a residential construction firm. Offered: A.

B CON 555 Construction Firm Management I (3) *Schaeffelberger* Management of construction company including organization, corporate structure, operation procedures, marketing, and human resources management. Emphasis on safety and loss prevention management, insurance and risk management, financing, accounting, marketing construction services, and bonding requirements for construction company. Other topics include individual and corporate planning and process of strategic planning. Offered: W.

B CON 560 Construction Firm Management II (3) Examination of the business practices, including market feasibility studies, related to use of Management Information Systems (MIS) in a construction company.

B CON 565 Managing International Projects (3) *Schaeffelberger* Study of processes involved in the selection, acquisition, and management of international construction projects. Emphasis is placed on examining common problems associated with managing construction projects outside the United States, identifying risks involved, and discussing possible solutions. Offered: Sp.

B CON 600 Independent Study or Research (* max. 6) An in-depth independent investigation of some facet of construction management. Offered: AWSpS.

B CON 700 Master's Thesis (* max. 9) Offered: AWSpS.

Landscape Architecture

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Undergraduate Program

Bachelor of Landscape Architecture

The Bachelor of Landscape Architecture (B.L.A.) program is a professional program accredited by the American Society of Landscape Architects. It is a five-year undergraduate sequence of lecture and studio courses which introduces students to historic and contemporary concepts in landscape architecture and teaches principles of landscape design for a wide variety of design situations, from urban to rural. Course work recognizes the effect of human interaction with the landscape and upon natural resources.

Program goals are to provide students with a strong design education, foster creativity, develop graphic and verbal communication skills, facilitate cognitive abilities, and encourage computer proficiency. Departmental courses include design studios, history of landscape architecture, design theory and practice, construction, graphics, and professional practice. Required courses from other departments include urban horticulture, soils, geology, botany, and ecology.

Course work is given practical application in design studios led by departmental faculty and members of the professional community. Studio topics include planting design, planning for large undeveloped ar-

eas, land planning and housing design for communities, urban landscape design, and design for natural and semi-natural areas. Course work develops an understanding of the functioning of natural systems and an awareness of the cultural and sociological forces that influence the landscape architect's work. Individual as well as team-oriented projects encourage the development of strong interactive, verbal, and evaluative skills.

Students with prior course work which meets departmental prerequisites and University requirements for graduation, may enter the three-year program which comprises the focused area of the program. In addition to required course work, the program encourages students to pursue personal interests through directed research and independent study within the department and in other departments. The program is structured to permit students to explore design-related areas which allow them to realize their creative potential and professional growth.

Satisfactory completion of University requirements in English composition, Reasoning and Writing in Context, and Areas of Knowledge is a prerequisite for entry into the program. Undergraduate students currently enrolled at the UW may apply for admission to the department after completion of a minimum of 60 credits of general education requirements. Major status is normally granted upon completion of 90 credits and after formal application to the department has been reviewed and accepted. The five-year B.L.A. program requires completion of 225 credits.

Transfer students from other academic institutions must satisfy University admission requirements. Students applying to the program for a second bachelor's degree are assumed to have completed the University's general education requirements.

Admission to the B.L.A. program is competitive and based on academic record, evidence of creative potential, as well as graphic and verbal fluency. Completion of prerequisite courses is required prior to admission. All students must submit their application forms and materials to the department by February 15 to be considered for admission the following autumn quarter.

Please contact the department for application materials and detailed information on admission, prerequisites, and required course work.

Graduate Program

Master of Landscape Architecture

The Master of Landscape Architecture program, accredited by the American Society of Landscape Architects, is a professional program that offers training in design and research. The program's diverse courses allow students to experience a range of project scales and to develop a specialty under professional guidance. The department curriculum emphasizes the following:

Design Education. The faculty are designers interested in social and ecological issues and in interdisciplinary design work. Most classroom investigations result in design proposals that foster the strong physical design tradition associated with landscape architecture. Landscape design is holistically defined in the classroom and could include the development of policies or standards leading to positive physical change, the detailed siting of elements such as roads or buildings in a landscape, and the development of maintenance or rehabilitation procedures.

Complex Landscape Issues. The core courses of study focus on complex landscape issues that balance political, ecological, social, or physiographic considerations. These issues are generally people-oriented and involve urbanization, land conversion, or restoration of existing environments.

Design Scholarship. Students are expected to advance their skills by exploring various research methods and techniques. The design studios are a testing ground for the development and exploration of different research perspectives. Students complete their studies with a thesis.

The graduate program accommodates persons with or without a design background and encourages applications from persons with diverse backgrounds, or from those who seek a career change. The faculty is experienced in teaching mature students and seeks a mix of student ages, backgrounds, and interests. Through elective courses students can tailor course work to their particular needs and the faculty will assist in maximizing the potentials of this multi-faceted University.

Graduate students may elect to participate in the College-wide inter-disciplinary Certificate Programs in Urban Design and Preservation Planning and Design. See program descriptions in the preceding College section.

Program Requirements

The program is tailored to each student's background. Students follow a specific course path based on their previous education, experience, and individual educational goals. Students with a B.L.A. degree begin with the "Required Graduate Curriculum," while students with no design or science background begin with the "Basic Core" and take science, design, or art courses for preparation for the final two years in the "Required Graduate Curriculum." The two-year "Required Graduate Curriculum" requires completion of a minimum of 72 approved credits.

The typical program for students with a limited design or science background varies and course work depends on the entrance proficiency of the applicant.

A scholarly thesis is required of all candidates, except for those who hold a Ph.D. The thesis allows students to select a subject for investigation, develop an appropriate research methodology, and analyze the subject for presentation in written and graphic form. The faculty places considerable importance on the thesis, and graduates have produced significant results.

Admission Requirements

Candidates applying to the Master of Landscape Architecture program must apply both to the Graduate Admissions Office and the Department of Landscape Architecture by January 15 to be considered for admission the following autumn quarter.

Admission to the Graduate School requires: 1) a baccalaureate degree from an accredited U.S. college or university, or its equivalent in a foreign institution, 2) a GPA of 3.00 or higher in the last 90 graded quarter hours or the last 60 graded semester hours, and 3) a Graduate Record Examination (GRE) score taken within the last five years.

Admission to the Master of Landscape Architecture program is a competitive process with priority given to applicants whose abilities, as determined by the department's M.L.A. Admission Committee, will enable them to complete the program expeditiously and with a high level of achievement. Contact the department for additional information.

Correspondence and Information

348 Gould, Box 355734

Faculty

Chair

David C. Streatfield

Professors

Bradley, Gordon A. * 1972, (Adjunct); PhD, 1986, University of Michigan; forest land use planning, recreation site planning and design.

Buchanan, Robert T. * 1970, (Emeritus); MLA, 1956, Harvard University; design, graphic communications, landscape aesthetics, environmental art.

Haag, Richard 1958; MLA, 1952, Harvard University; theory and perception of landscapes, master planning, urban recreation, recycling landscapes.

Johnston, Norman J. * 1960, (Emeritus); PhD, 1964, University of Pennsylvania; urban design, history.

Streatfield, David C. * 1974; MLA, 1965, University of Pennsylvania; regional landscape planning; landscape, architectural and environmental history.

Untermann, Richard K. * 1971, (Emeritus); MLA, 1967, Harvard University; urban design and site planning, housing, recreation, nonmotorized circulation.

Associate Professors

Dubrow, Gail Lee * 1989, (Adjunct); MA, 1979, University of Oregon; PhD, 1991, University of California (Los Angeles).

Horner, Richard R. * 1981, (Research); PhD, 1978, University of Washington; wetlands, conservation and storm water management.

Robertson, Iain M. * 1982; MLA, 1975, University of Pennsylvania; designing with plants, planning and design of botanical gardens/arborescences.

Schauman, Sally * 1979; MS, 1971, University of Michigan; visual resource analysis and evaluation, resource planning and conservation of stressed landscapes.

Assistant Professors

Booth, Derek B. 1980, (Research); PhD, 1984, University of Washington, geomorphology, environmental geology.

Heerwagen, Judith * 1981, (Adjunct Research); PhD, 1982, University of Washington; behavioral ecology.

Johnson, Julie M. 1995; MCP, 1988, Massachusetts Institute of Technology; design and use of urban parks, neighborhood and community design, cultural expressions in landscape.

Winterbottom, Daniel M. 1993; MLA, 1988, Harvard University; urban design, construction, cultural landscapes, public art and therapeutic landscapes.

Witherspoon, Boykin 1990; MLA, 1990, Louisiana State University; computer applications in landscape architecture, urban planning, GIS, resource management.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

L ARCH 200 Landscape Architecture Field Trips (2) VLPA/MS Five field trips introduce typical landscape architecture projects and demonstrate scope of the landscape architecture field. Visits to major projects in the Puget Sound region include city and county parks, river parks, harbors, downtown redevelopment, streetscapes, campus headquarters, and others. Open to nonmajors.

L ARCH 300 Introductory Landscape Architecture Design Studio (6) VLPA Introduction to history and environmental influences in field while developing design and graphic skills. Site analyses and drawing to convey design concepts. Relationship of visual perception to drawing, role of values in design, verbal communication, and behavioral analysis of design process. Required for admission to Bachelor of Landscape Architecture program.

LARCH 301 Site Planning Studio (8) Introduction to site planning and landscape design, covering the factors of site analysis and planning, resource utilization, site suitability related to specific programs and activities; and planning, design, and behavioral studies for selected case study projects. Includes design graphics and issues relating to professional awareness.

LARCH 302 Site Design in Urban Context (5) Design of public use areas in the urban area. Project types for this course are waterfront development, commercial areas, campus and cultural centers, plazas and historical sites; recommendation for policy to be established as part of the design solution.

LARCH 303 Natural Processes Studio (5) Project design studies related to natural systems. Computer applications are introduced.

LARCH 310 Landscape Architecture Field Sketching (2) Introductory level sketching of landscape subjects: natural and urban sites, plants, animals, architectural elements. Emphasis on perspective. Various media, including pencil, charcoal, markers, ink wash, water color.

LARCH 311 Introduction to Design Graphics (2) Introduction to communication techniques for various phases of the design process. Many techniques are introduced and their suitability and appropriateness for different purposes explored.

LARCH 322 Introduction to Planting Design (3) VLPA Traditional ways plants are used in landscape design. Composition and design characteristics of plant materials. Technical considerations for selection, climate, cultural suitability, availability, costs, and maintenance. Open to nonmajors.

LARCH 331 Landscape Construction (4) Basic course in site engineering, correlating the design and technical aspects of site development and suitability. Grading, drainage, circulation requirements and alignment, organization concepts relative to landscape resources, site evaluation, utilization and protection, and building and site program analysis and coordination.

LARCH 332 Landscape Construction (4) Materials and structures in landscape construction. Design criteria and construction techniques for detail elements of landscape architecture. Working drawings, specifications, cost estimates, and procedures. Prerequisite: 331.

LARCH 341 Site Planning (3) Introduction to site planning and landscape design, covering the factors of site analysis and planning; resource utilization; site suitability related to specific programs and activities; and planning, design, construction, and behavioral studies for selected case study projects. Open to nonmajors.

LARCH 352 History of Landscape Architecture (3) VLPA/I&S Survey of the development of landscape architecture as an art form from Mesopotamia to the present. Relationships to physical landscape, climate, culture, religion, and other arts. Open to nonmajors.

LARCH 353 History of Modern Landscape Architecture (3) VLPA/I&S Development of profession and art of landscape architecture in the United States, Europe, South America, and Japan in relation to prevailing social, economic, political, and cultural factors. Relationships with other professions, especially architecture and urban planning, and other arts, such as painting and sculpture. Open to nonmajors.

LARCH 361 Theory and Perception of Landscape Architecture (3) VLPA/I&S Reciprocal relationships of man/nature are explored, with particular attention given to the cultural variations and interpretations of esthetics, landscape materials, and human behavior and their effects on site planning and project design. Landscape architecture philosophy related to the

physical design problems and potentials of the Pacific Northwest. Open to nonmajors.

LARCH 362 Landscape Design in Urban Contexts (3) VLPA Introductory lecture course relating methods, procedures, and rationale for use of natural processes information in planning and site design. Discussion covering environmental constraints and landscape sensitivity. Open to nonmajors.

LARCH 363 Natural Processes as Planning and Design Determinants (3) NW Introductory lecture course relating methods, procedures, and rationale for use of natural process information—soils, vegetation, hydrology, physiography, wildlife, and geology. The planning/design process covers areas of critical concern, environmental constraints, natural systems, landscape character, and capacity of site to recover from human intervention. Open to nonmajors.

LARCH 401 Urban Recreation Design (6) VLPA/I&S Special studies in metropolitan, urban, and neighborhood recreation areas; the design, policies, and behavioral studies of existing parks, playgrounds, public places, and commercial areas. Design projects dealing with the play environment for all ages. Open to nonmajors.

LARCH 402 Site Design/Cluster Housing (6) Large-scale site planning and design. Generally related to housing, new communities, and institutional development. Identification of landscape character, resources, and problems of site, cost factors, design alternatives and implications for architectural direction, policy for land acquisition. Program development to maximize site utilization and preservation of natural attributes.

LARCH 403 Cultural Landscape Studio (6) Studies of the landscape at various scales and in diversified contexts. Offers better understanding of visual components of landscapes, designer's capacity to evaluate and change these components, and resultant interaction with, and effect on, landscape user.

LARCH 408 Individual Design Studio (6) Senior projects in landscape architecture; projects vary according to the student's particular emphasis and needs.

LARCH 411 Landscape Graphics (3) Delineation techniques for landscape perspectives, sections, rendering of plant materials. Historical and contemporary examples of landscape drawing.

LARCH 412 Landscape Communications (2) Multimedia and video production techniques and presentation methods suitable for public hearings; citizen groups, design commissions, and private clients. Individual projects and case-study examples.

LARCH 423 Planting Design Studio (3) Utilization of plants as design elements to manipulate space and modify the landscape for various activities and resolutions of site problems. Factors that determine the appropriate use and arrangement of plant materials in an urban context. Composition, plant selection, planting techniques, and maintenance requirements are major components of this class. Prerequisites: 322 and BOTANY 331 or equivalent.

LARCH 424 Advanced Planting Design Seminar (2) Analyzes the complex relationship between plants, man, and environment and affords opportunity to explore methods of utilizing these relationships to plant and to design more responsive landscapes.

LARCH 425 Advanced Planting Design Studio (6) Advanced seminar/studio in planting design. Provides opportunity to explore ecological, technical, and esthetic principles for selecting plants to meet specific site conditions. Project types include historical sites, multifamily housing projects, plazas, landfills, and reclamation sites.

LARCH 433 Large-Scale Site Construction (4) Includes studies of natural determinants and restraints

on large-scale construction, development affected by service and utility systems, physiographic suitability of site, cost-benefit analysis, and critical path methodology for site construction projects. Prerequisites: 331, 332, and GEOL 313.

LARCH 440 Computers in Landscape Architecture (3) Laboratory, lecture, and demonstration classes to introduce software applications specific to required landscape architecture courses. Credit/no credit only.

LARCH 450 History of Environmental Design in the Pacific Northwest (3) VLPA Development of landscape architecture, architecture, and urban planning in the Pacific Northwest from nineteenth century to the present, with major emphasis on twentieth century. Open to nonmajors.

LARCH 451 History of Environmental Design on the West Coast (3) VLPA Development of the environmental arts of landscape architecture, architecture, and urban planning from the eighteenth century to the present, with major emphasis on the twentieth century. Open to nonmajors.

LARCH 463 Urban Recreational Design (3) VLPA/I&S Special recreational studies in metropolitan, urban, and neighborhood areas; the design, policies, and behavioral studies of existing parks, playgrounds, public places, and commercial areas. Design projects dealing with the play environment for all ages. Open to nonmajors.

LARCH 470 Landscape Architecture Tutorial (2, max. 6) Various aspects of project organization, programming, scheduling of work loads, graphic and verbal communication problems, data collection methods and interpretation, methodologies for landscape planning and design. Prerequisites: fourth- or fifth-year standing and one quarter advance permission of instructor.

LARCH 473 Professional Practice (3) Professional practice in private office, academic institutions, and public agencies. Evolution of landscape architecture as a profession, possible scenarios for future, variety of practice types and their relationships, ethical and legal/contractual responsibilities of a professional.

LARCH 474 Project Design (6) Detailed design studies of small-to-medium-scale projects. General focus on public landscape areas and social/psychological uses of site. Specific focus on design development and professional office presentation. Prerequisite: fifth-year standing in the Bachelor of Landscape Architecture program.

LARCH 476 Professional Operations (3-6) Practicum course for landscape architecture majors for internship and exposure to the profession with working experiences at various levels of professional endeavor. Student apprenticeship in selected private offices and public agencies. Credit/no credit only.

LARCH 477 Landscape Architecture Consultancy Studio (3-6) Simulation of the professional relationship of the landscape architect as a consultant to University students in other design planning and management disciplines. Focus is on site analysis, master planning, schematic designs and detailed design, working drawings, and planting plans associated with student projects. Prerequisite: fourth- or fifth-year standing in the department.

LARCH 485 Landscape Architectural Studies Abroad (1-10, max. 30) Studies conducted under faculty supervision in various locations outside the United States. Prerequisite: permission of instructor.

LARCH 488 Special Projects (1-10, max. 30) Special projects as arranged. Open to nonmajors.

LARCH 499 Undergraduate Research (1-6) Individual or small-group studies pertaining to special problems, theories, or issues of landscape architecture.

ture and environmental issues. Prerequisite: approval of a faculty sponsor.

Courses for Graduates Only

LARCH 501 Landscape Design and Planning I (6) Enhances perceptual awareness and design sensitivity to natural and man-made landscapes. Basic skills necessary for more advanced course work required in the Master of Landscape Architecture degree program. Examination of landscape environment through problem-solving techniques that acknowledge holistic approach to the environment.

LARCH 503 Landscape Design of Communities (6) Methods and techniques for developing physical design solutions and implementation strategies in neighborhoods and small communities. Social, economic, political, and individual forces affecting community development and growth. Comparison of several communities, identifying pertinent landscape issues, potential design solutions, and methods for achieving design goals through the political process.

LARCH 504 Regional Landscape Planning (6) Studio in applied regional landscape planning in metropolitan regions to examine conflicting land-use pressures of urban/rural fringe. Ecosystematic approach emphasizes maintenance of landscape quality. Computer applications in design.

LARCH 505 Regional Landscape Design (6) Theory/techniques of regional design to analyze, evaluate, plan, design, and manage the resources of the regional landscape continuum.

LARCH 506 Landscape Visual Resources (6) Survey of existing theory/techniques and the generation of new methods to analyze, evaluate, plan, design, and manage the visual resources of the landscape.

LARCH 507 Landscape Art (6) Public art placed in, or developed for, specific landscape settings. Various aspects and benefits of public art, including materials, technologies, philosophies of landscape imagery and meaning. General planning criteria for location for maximum public benefit and identification of objectives for a specific site and artwork.

LARCH 511 Visual Learning (3) Seminar/laboratory to develop visual learning processes and skills for applying these processes to landscape architecture. Related visualization concepts.

LARCH 523 Landscape Technology (6) Studio on application of technologies and their appropriateness for rehabilitation, restoration, and creation of landscapes at site-specific scale. Examination of maintenance programs, implementation problems, and public policy. Open to nonmajors.

LARCH 550 History and Theory of Modern Landscape Architecture (3) Lecture/seminar on history and theory of landscape architecture from the eighteenth century to the present. Relation to theory in related environmental design disciplines such as architecture and urban planning and other disciplines such as geography.

LARCH 561 Regional Landscape Planning and Design (2) Seminar on objectives, philosophy, history, and theory of regional landscape planning and design. Overview of the context of regional landscape planning, examination of critical issues in the Pacific Northwest, and opportunities and role of the landscape architect in addressing these issues.

LARCH 562 Landscape Art (2) Process of developing and placing artwork in specific landscape settings. Types of artwork and landscape settings; ways for artist and site designer to interpret, alter, and incorporate factors of landscape; viewer's perception and experience; examples of public and private support.

LARCH 570 Scholarship and Research in Landscape Architecture (3) Seminar on the trends and

results of research related to landscape architecture. Introduction to important scholars and researchers. Open to nonmajors with permission of instructor.

LARCH 571 Seminar on Landscape Architecture Research (3) Introduction and exploration of problems and opportunities of several basic research methods currently employed in landscape architecture research. Emphasis on how researchers identify research topics and develop appropriate research methods. Introduce analysis and interpretation of research results.

LARCH 590 Seminar in Landscape Architecture (1-3, max. 12) Advanced topics in landscape architecture with focus on unpublished areas of research.

LARCH 598 Special Topics (1-6, max. 9) Systematic study of specialized regional landscape subject matter, including history, technology, implementation, and other topics depending on current interest/needs. Topics vary and are announced in the preceding quarter.

LARCH 600 Independent Study or Research (*)

LARCH 801 Internship (3-9) Credit/no credit only.

LARCH 700 Masters Thesis (*)

Urban Design and Planning

410 Gould

Urban planning deals with critical issues of human settlement and urban development. It requires special knowledge, skills, and vision to provide communities with an informed basis for coordinated action. Urban design and planning constitute a professional field of growing complexity, responding to the urban complexities of this century and the next. The Department of Urban Design and Planning fosters an integrative approach to education and research in planning the physical environment. The academic program includes: the social, behavioral, and cultural relationships between people and the form and quality of their built environment; the financial, administrative, political, and participatory dimensions of planning, design, and development; and the informational base for making deliberate decisions to shape urban areas, bringing analysis together with vision.

Departmental faculty are active participants in the College's Cascadia Community and Environment Institute including the Center for Sustainable Communities and the Center for Community Development and Real Estate. The department also administers the Remote Sensing Applications Laboratory (RSAL), concerned with teaching, research, and public service applications in urban planning for information produced by remote sensing technology, including aerial photography and satellite systems such as Landsat and SPOT. RSAL also conducts related research in applications of geographic information systems (GIS). The lab houses a SUN UNIX workstation hosting ARC/INFO and other GIS and image processing software. In addition, the College has a wide array of facilities for computer-based instruction related to design, including CAD, GIS, and hypermedia. The Institute also runs a joint program in advanced computer technology and virtual reality with the Human Interface Technology Laboratory of the Washington Technology Center.

Minor

Minor Requirements: 30 credits to include URBDP 300 (5 credits); 3 credits chosen from URBDP 460, 461, or 471; minimum 10 additional credits in URBDP-prefix courses, and 12 additional credits in planning-related courses. A 2.0 minimum grade required for each course counted toward the minor. See departmental adviser for recommended courses.

Graduate Program

Frank V. Westerlund, Graduate Program Coordinator, M.U.P. Program

Gary E. Pivo, Graduate Program Coordinator, Ph.D. Program

The Department offers the Master of Urban Planning (M.U.P.) degree and its faculty participate in the interdisciplinary Doctor of Philosophy (Ph.D.) in Urban Design and Planning. The M.U.P. is the professional degree, and the Ph.D. is primarily for students planning to enter research and teaching positions in urban planning and design. A concurrent degree program is possible with the J.D. in the School of Law.

The graduate program focuses on planning the physical environment and its socioeconomic and political determinants. Advanced students are encouraged to conduct research and studies in one of the following specializations:

- urban design dealing with physical form, character, and quality issues
- community development and real estate including public/private development processes, public policy, physical development and design, and finance
- preservation planning and design
- land-use planning, including its environmental, socioeconomic, legal, information systems, and administrative aspects.

Graduate students may elect to participate in the College-wide Certificate Programs in Urban Design and Preservation Planning and Design. See program descriptions in the preceding College section.

Master of Urban Planning

The Master of Urban Planning degree is the usual educational qualification for professional practice of city and regional planning, including generalist planning, research, urban design, and administrative positions in a wide variety of public agencies and private consulting firms. It is a two-year, or six-quarter program, requiring a minimum of 72 credits.

Requirements for graduate-level study include a satisfactory academic record and undergraduate training in one of a variety of disciplines, including urban planning and environmental design or in other appropriate fields, such as geography, economics, or other social sciences; English and other humanities; civil engineering and environmental studies; or architecture and landscape architecture. Students planning to enter the program should have completed at least one college-level course in each of the following areas: economics, mathematics, statistics, American government, environmental systems, and cultural diversity. Students without sufficient background must take these prerequisite courses concurrently with their graduate studies.

The primary objective is to educate professional planners with a broad range of competence in planning and design; a second objective is to provide opportunities for individual studies in selected professional areas. Core course requirements include 31 credits covering the history and theory of planning and urban design, resources for planning in the local context, urban form, communication methods, quantitative methods, processes and methods of land use planning, planning law, research methods, and a first-year planning studio. 14 credits of restricted electives are required, including a course in advanced methods and a second studio; both may be in an area of specialization. In addition, a course in land-use planning and in urban development economics is required. A 9 credit thesis or professional project is required upon completion of all other degree course work. 18 credits of the 72 minimum required for the degree may be in open electives.

The core provides a foundation in urban design and planning for all students. An internship is required for those without previous professional experience. A specialization in one area of planning is encouraged. Four major specialized areas offered in the department include physical land-use planning and growth management, community development and real estate, urban design, and preservation. Other opportunities include transportation planning with Civil Engineering, public policy and management with Public Affairs, environmental resource planning with Forest Resources, environmental planning with Landscape Architecture, and coastal planning with Marine Affairs.

Students are admitted to the M.U.P. program primarily in autumn quarter and all application material should be received by the department no later than the preceding February 1. Graduate Record Examination general test scores, three letters of recommendation, transcripts of previous degree programs and any additional academic study, and a statement of purpose are required.

Doctor of Philosophy

Some of the departmental faculty are part of an interdisciplinary faculty group which offers doctoral study in urban design and planning. The program is located administratively within the Graduate School. For a description of the program, see the Interdisciplinary Graduate Degree Programs section of the catalog.

Correspondence and Information

Master of Urban Planning Program
Graduate Program Coordinator
410 Gould, Box 355740

Faculty

Chair

Dennis M. Ryan

Professors

Amoss, Harold L. 1963, (Emeritus); MA, 1947, University of New Mexico; PhD, 1951, University of California (Berkeley); planned social change, community organization.

Bell, Earl J. * 1966, (Emeritus); PhD, 1965, University of California (Berkeley); operations research, statistics, quantitative methods and geographic information systems.

Grey, Arthur L. * 1963, (Emeritus); PhD, 1954, University of California (Berkeley).

Hancock, John L. * 1969; PhD, 1964, University of Pennsylvania; urban and planning history, society, planning and environmental policy.

Johnston, Norman J. * 1960, (Emeritus); PhD, 1964, University of Pennsylvania; urban design, history.

Ludwig, Richard L. * 1971; PhD, 1971, University of Pittsburgh; housing development planning, social factors in development planning.

Miller, Donald H. * 1970; PhD, 1972, University of California (Berkeley); land use and urban spatial structure; data analysis and forecasting, planning theory.

Nyberg, Folke E. * 1969; MArch, 1960, Yale University; theory, urban design, professional practice.

Schneider, Jerry * 1967, (Emeritus); PhD, 1966, University of Pennsylvania; metropolitan area and regional planning, transportation and other urban models.

Streitfield, David C. * 1974; MLA, 1965, University of Pennsylvania; regional landscape planning; landscape, architectural and environmental history.

Untermann, Richard K. * 1971, (Emeritus); MLA, 1967, Harvard University; urban design and site planning, housing, recreation, nonmotorized circulation.

Vernaz Moudon, Anne * 1980; DSc, 1987, Ecole Polytechnique Fédérale de Lausanne (Switzerland); urban design, city form and neighborhood studies, design research.

Wong, Shawn H. * 1984, (Adjunct); MA, 1974, San Francisco State; creative writing, Chinese-American area studies.

Associate Professors

Dubrow, Gail Lee * 1989; MA, 1979, University of Oregon; PhD, 1991, University of California (Los Angeles).

Kasprisin, Ronald J. * 1989; MUP, 1968, University of Washington; community design studios, town planning, planning/design communications, urban design principles.

Norton, Thomas J. * 1968, (Emeritus); MUP, 1960, University of Washington; urban community facilities, planning administration.

Pivo, Gary E. * 1987; PhD, 1987, University of California (Berkeley); land use and physical planning, environmental planning, growth management.

Rolle, George R. * 1984; MArch, 1968, MCP, 1968, University of Pennsylvania; urban development process, finance, feasibility and market analysis, urban design processes.

Ryan, Dennis M. * 1974; PhD, 1976, University of Pennsylvania; community planning, design, and identity; public processes; urban design, change, and continuity.

Westerlund, Frank * 1971; PhD, 1977, University of Washington; remote sensing applications, energy development and conservation, regional environmental planning.

Lecturer

Lawrence, J. Gary 1994; MPA, 1976, University of Georgia.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

URBDP 300 Introduction to Urban Planning (5) I&S Principles and theories of urban structure and institutions. Concepts and logic of planning as a community process and a professional activity. Evolution of planning ideas in response to changing social, economic, and environmental conditions within the American political framework. Complementary nature of public and private responsibilities. Major procedures used by planners. Prerequisite: junior standing or permission of instructor.

URBDP 370 Reading the City (3-5) VLPA/I&S Hancock, Moudon Comprehending cities as reflections of individuals and societies. Students trained to read and analyze everyday, visible evidence of the city. Addresses interests of travelers as well as students wanting to become active participants in decisions affecting the quality of the urbanized environment. Field trips, readings, lectures, visual learning techniques.

URBDP 407 Urban Planning Studio (5) VLPA/I&S Ryan Synthesis of urban design and planning problems and methods in a laboratory section. Prerequisites: 300 or permission of instructor.

URBDP 420 Database Systems and Planning Analysis (3) Applications of relational database management systems in urban design and planning. Emphasis on practical aspects of database design and use. Design, create, and modify databases and database applications, including spatial databases. Introduction to GIS. Use of personal computers linked

to desktop mapping packages and relational database management systems.

URBDP 422 Geographic Information Systems in Planning (5) Principles of GIS applied to problems in urban design and planning, landscape architecture, and environmental and resource studies. Practical problem-solving approaches using contemporary desktop mapping packages and vector and raster GIS systems. Siting, environmental evaluation and inventories, and modeling. Prerequisite: 420 and GEOG 460 or 461 or permission of instructor.

URBDP 429 Computer-Aided Planning of Urban Systems (3) Survey of on-line planning applications; use of various on-line systems to solve urban systems design problems; investigation of hardware/software trade-offs; human factors in man-computer systems design theory as it relates to problem-solving activity. Offered: jointly with CIVE 418.

URBDP 446 Practical Experience (4, max. 8) Ryan Off-campus internship under academic supervision in situations useful to the education of planners, such as public/private planning and design offices, projects related to the environment, cross-cultural matters, and decision making. Assistance in identifying appropriate projects. Prerequisite: permission of instructor.

URBDP 451 Housing (3) I&S Ludwig Survey of housing and redevelopment problems, theories, standards, and practice. Development of public policies, finance, technological considerations, social factors, and priorities. Prerequisite: 300 or permission of instructor.

URBDP 452 Urban Development and Spatial Structure (3) I&S Miller Physical and functional structure of urban areas, with major focus on locational decision making in households, firms, and other organizations, and space demands of these urban activities. Selected land-use models illustrating use of this theoretical understanding for forecasting competition, land-use conflicts, and the land-conversion process.

URBDP 453 Introduction to Urban Economics and Development (4) I&S Introduction to urban economics and impacts on real estate development with emphasis on land allocation, location theory, rent/value theory, factors affecting growth and decline of cities, and the role of governmental regulation/policy/finance in controlling real estate development. Offered: jointly with B CON 453.

URBDP 454 Introduction to Real Estate Development Processes (4) Rolle Introduction and survey of processes and people involved in developing real estate, including issues of site control, public/private approvals, feasibility analysis, project financing, design/construction, marketing, and asset management. Recommended: completion of 453. Offered: jointly with B CON 454.

URBDP 455 Introduction to Real Estate Finance (4) Rolle Introduction to the financing of real estate development projects, including a survey of capital markets, banking regulations, interest/discounting theories, debt instruments, and project financing. Recommended: 454. Offered: jointly with B CON 455.

URBDP 456 Real Estate Investment Seminar (3) Rolle Analysis of private and public real estate investment decisions using case studies of individual development projects. Focuses on application of principles introduced in 453, 454, and 455. Prerequisites: 454 and 455. Offered: jointly with B CON 456.

URBDP 457 Housing in Developing Countries (3) Ludwig Emphasis on role of the design and planning professional in housing delivery in developing countries. Exploration of issues of culture, political environment, social context, economic circumstances, and other factors which define and limit the manner in which the professional planner and designer can and should function. A

URBDP 460 History of City Development (3) *VLPA/IAS Dubrow, Hancock* Analysis of city forms and designs, emphasizing their relation to the culture of each period.

URBDP 461 History of Urban Planning in the United States (3) *IAS Hancock* Seminar in origins, development, and significance of the American planning movement and the profession that emerged from it, as defined by some of its seminal innovators, theories, practices, and achievements, and as evaluated by cultural realities thereby served.

URBDP 465 Land Use (3) *IAS Westerlund* Substantive presentation of land use as a focus for planning issues. Development of problems: consideration of analysis, programming, and implementation methods. Seminar and group project sections.

URBDP 466 Infrastructure and Community Facilities (4) *Pivo, Rolfe* Issues and methods associated with planning for parks, schools, drainage, sewerage, utilities, libraries, solid waste and transportation. Covers their relationship to comprehensive plans, project permitting and impact assessment. Financing, regulating, and relationships to social, environmental, and economic goals are discussed.

URBDP 467 Urban Planning Uses of Remote Sensing (3) *Westerlund* Using aerial photographs, related data, and maps in urban planning. Urban change analysis, land-use classification systems, other planning applications. Scale and resolution considerations. Development of proficiency through laboratory exercises. Prerequisite: 300 or equivalent. Recommended: 465.

URBDP 468 Land Use From Satellite Data (3) *Westerlund* Digital data from Landsat and other sources used to determine land-use and land-cover classification in urban and rural areas. Hands-on exercises on computer. Photo interpretation, statistics, land-use classification, and verification are incorporated. Prerequisite: 465, 467, or permission of instructor.

URBDP 470 Introduction to Urban Design (3) *VLPA/IAS Kasprisin, Ryan* Definitions and examples of urban design; heritage of urban design; theories of city building; the role of urban design in the fields of architecture, landscape architecture, and urban planning.

URBDP 471 History of Urban Design (3) *VLPA/IAS Streafeld* Aspects of form, pattern, and space that mark efforts of individuals and groups to express their values and goals in the design of their cities. Special attention given to both historical and modern examples.

URBDP 472 Creativity and Culture in Design (3) *Kasprisin* Exploration of creativity in design from a system theory perspective. Theoretical readings in physics, biology, and behavioral science balanced with practical approaches and case studies in urban design and architecture literature. Offered: A.

URBDP 479 The Urban Form (3) *VLPA Moudon, Nyberg* Elements, patterns, and evolution of urban form. The forces that shaped cities in history. Contemporary trends. Methods of urban morphological analysis as related to urban design and planning practices. Required for MUP graduate students.

URBDP 481 Metropolitan Planning and Development in Developing Countries (3) *Ludwig* Examination of the nature and causes of urban planning and management problems in developing countries and exploration of alternative approaches to solve some of these problems. Offered: W.

URBDP 482 Politics and Planning (3) *IAS Hancock* Explores the need to understand the crucial role of politics in the planned development of American communities, to think critically and constructively about the relationship of politics and development and

ways to make it as democratic and equitable as possible, and to strengthen analytical and writing skills. Sp.

URBDP 494 Alaska Field Study (3) *Kasprisin, Westerlund* Travel to communities within the Southeast Alaska bioregion for interpretation of natural systems, history, cultures, settlement patterns, and current issues of planning and economic development. Meetings with community leaders and planners. Students either select topic for field and documentary research or participate in intensive charrette-type project in one community. Offered: Sp.

URBDP 498 Special Topics (1-8, max. 15) Systematic study of specialized subject matter. Topics for each quarter vary, depending upon current interest and needs, and are announced in the preceding quarter. Prerequisite: permission of instructor.

URBDP 499 Special Projects (* max. 6) Independent/tutorial study for undergraduates. Individual reading, research, fieldwork, or other special project, outlined in advance, approved by, and under the direction of, the faculty adviser most appropriate for the project proposed. A report on the purposes, procedures, and results of the study is required. Prerequisites: senior standing and permission of supervising instructor.

Courses for Graduates Only

URBDP 500 Survey of Urban Planning (3) *Dubrow, Miller* Concepts and logic of planning as a professional activity. Evolution of guiding ideas in relation to changing social, economic, and environmental conditions within the American political framework. Major procedures used by planners. Critical appraisal. Open to graduate students in urban design and planning and to graduate students in architecture seeking the urban design certificate.

URBDP 501 Resources for Urban Planning (2) Introduction to areas of specialized study in environmental planning and policy programming. Organization for planning in the Seattle region; range of activities and emphases, established and changing roles.

URBDP 503 Communications and Analysis (4) *Kasprisin* Development of communication skills understanding within the planning and design process. Presentation of communications as a design process with mental, visual, oral, written, and kinesthetic cognitive actions combined to form communications thinking. Offered: W.

URBDP 507 General Urban Planning Laboratory (5) Laboratory exercise in applied professional planning, utilizing a local study area to examine the realities of problem solving in situations of functional and normative conflict. Integration of analysis, programming, implementation, and presentation phases of the planning process.

URBDP 508 Specialized Planning Laboratory (5, max. 10) Several options are offered each year, such as regional-environmental planning, housing, metropolitan planning, and urban design. Prerequisites: 500 and 507. Additional prerequisite for some sections: urban planning seminar or lecture courses.

URBDP 510 Theories and Methodologies of Planning I (4) Survey of the philosophy, methods, and analytical techniques used in planning public actions and policies, with emphasis on the logic and assumptions upon which these are based. Various planning surveys and methods. Open to graduate students in urban design and planning and to graduate students seeking the urban design certificate. Prerequisite: 500.

URBDP 511 Theories and Methodologies of Planning II (4)

URBDP 512 Research Seminar (2) *Dubrow, Hancock* Development and presentation of advanced topics of individual investigation.

URBDP 520 Quantitative Methods in Urban Design and Planning (4) Methods of statistical and

mathematical analysis in design and planning. Emphasizes the use of computer packages for analyzing urban data. Regression, matrix methods, cohort-survival populations models with examples solved on microcomputers. Prerequisite: college mathematics and basic course in probability and statistics.

URBDP 525 Evaluation in Urban Planning (3) *Miller* Methods and techniques for a priori assessment of physical improvement plans, program designs, public policies. Includes cost effectiveness and matrix or goal achievement, as well as more conventional cost-benefit and cost-revenue forms of analysis. Emphasis on understanding the reasoning and issues in evaluation, and gaining a working competence in at least one of the methods treated.

URBDP 529 Urban Region Geocoding and Land-Based Information Systems (3) *Bell, Westerlund* Multipurpose street network and land-based information systems. The U.S. census geocoding system, automated map overlay systems, and cadastral file information use. Applications to land surveying, urban and transportation planning, and geographic analysis. Offered: jointly with CETS/GEOS 529.

URBDP 530 Land-Use/Transportation Models (3) Review of theoretical basis of several existing models used to forecast urban growth patterns and their associated land-use, transportation, and energy requirements. Model validation studies in relation to empirical studies of urban growth and change. Environmental implications of alternative urban growth patterns. Offered: jointly with CETS 570.

URBDP 537 Open Space Land Uses (3) *Westerlund* Exploration of public and private values of open space; its aesthetic, environmental, recreational, natural resource uses from development sites to metropolitan regions. Methods of open space inventory, analysis; legal and administrative tools for preserving; managing open space; development of multipurpose open space programs in local governments. Prerequisites: 500 and 510.

URBDP 546 Practicum (4, max. 8) Off-campus experience under academic supervision in situations useful to the education of planners, such as planning offices, public bureaucracies, projects related to the environment, cross-cultural matters, and decision making. Assistance in identifying appropriate projects. Credit/no credit only. Prerequisite: permission of instructor.

URBDP 547 Professional Project (1-8) Independent development of client oriented project involving application of professional planning/design methods and approaches. Professional-quality report relates project to larger professional context, addresses alternative approaches/methods and includes an evaluation of the project. Master of Urban Planning students only, taken in lieu of 700. Not recommended for those continuing into Ph.D. program. Credit/no credit only.

URBDP 552 Urban Development and the Real Estate Market (3) Topical survey of urban development. Provides substantive information, methodology, theory, and base for additional courses and seminars in area. Includes urban economy and determinants of land use, capital investment in urban development, land tenure, urban functions and public sector, urban development policy and strategy. Prerequisite: permission of instructor.

URBDP 553 Urban Real Estate Finance and Investment (3) Develops principles for evaluating opportunities to invest in urban real estate, discusses the question of determining the cost of capital for such investments, investigates some problems in the application of an appropriate investment criterion to specific types of opportunities, and explores some aspects of the urban renewal problem. Prerequisite: 552 or permission of instructor.

URBDP 570 Urban Design Process (3) *Kasprisin* The study of concepts, methods, and processes basic

to planning, design, and effectuation. Credit/no credit only. Prerequisite: specialization in urban design or permission of instructor.

URBDP 571 Research and Analytical Methods for Urban Design (3) *Moudon* Conceptual framework for an epistemology of urban design and physical planning. Review of relevant research in related fields and disciplines. Prerequisite: specialization in urban design or permission of instructor.

URBDP 572 Case Studies in Urban Design and Development (3) Wide range of urban design and development projects recently completed. Effective urban design implementation, including design process, decision making, administration, management. Tools and techniques such as design analysis, policy making, regulation, design review, taxation, financing. Prerequisites: 510 and 580 and/or permission of instructor.

URBDP 574 Residential Design: Methods and Practices (3) *Moudon* Review of approaches to housing people in growing metropolises and cities, nineteenth century to present. Emphasis on Western Europe, North and South America. Focus on selected contemporary issues in neighborhood and dwelling design, methods and practices. Offered: jointly with ARCH 593.

URBDP 580 Legal and Administrative Framework for Planning (4) Political, legal, and administrative institutions closely related to the planning process. Issues of devolution of authority and public representation and participation. Legal basis for planning and associated regulation.

URBDP 585 Introduction to Historic Preservation Planning (3) *Dubrow* Theories, methods, and practices associated with historic preservation planning. Overview of preservation planning programs at federal, state, and local levels. Introduction to tools and methods needed to identify, document, evaluate, and plan for protection of historic properties. Provides opportunity to learn fundamentals of preservation planning through practical experience. Offered: Sp.

URBDP 586 Implementation in Preservation Planning and Urban Design (3) Analysis of recent case studies in implementation of preservation planning and urban design in terms of planning and design products and related processes, decision making, administration, management. Tools and techniques include design analysis, policy-making, regulation, design review, taxation, financing, public participation. Prerequisite: introductory course in preservation or urban design.

URBDP 587 Implementation in Preservation Planning and Urban Design (4) Exploration of theoretical, methodological, and practical issues related to the preservation of vernacular architecture and cultural landscapes in the United States. Offered: W.

URBDP 591-592-593 Doctoral Seminar I, II, III (4-4-4) Researchable issues and research methodology. Discussion and critique of selected pieces of recent research work. Presentation and critique of research proposed by members of the seminar. Prerequisite: masters degree or equivalent in a planning discipline.

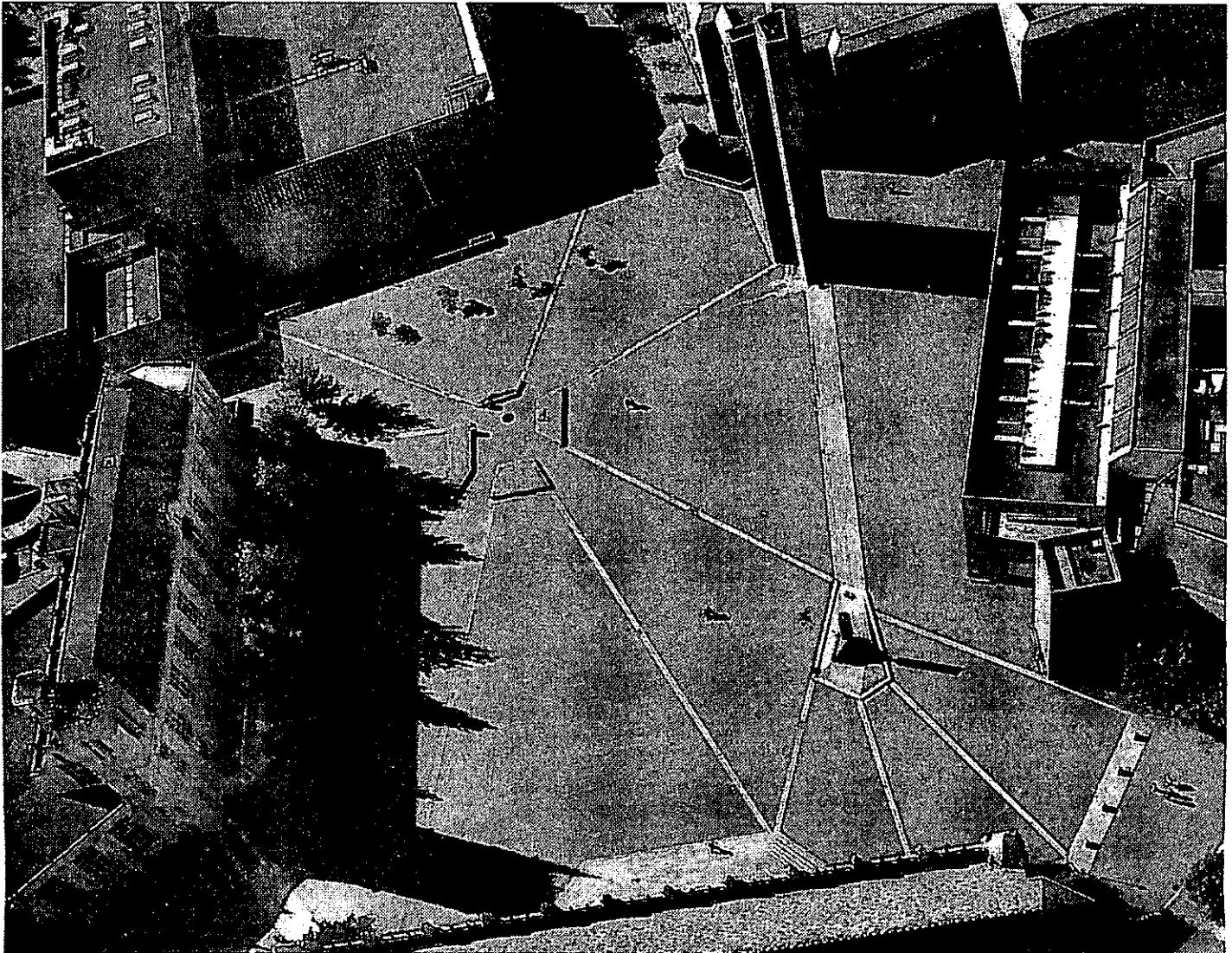
URBDP 597 Pacific Northwest Bioregion Forum (1) *Kasprisin* Exchange between universities of Pacific Northwest to share ideas and information on planning related ecological issues within the bioregion. Offered: AW.

URBDP 598 Special Topics (1-6, max. 15) Systematic study of specialized subject matter. Topics vary for each quarter, depending upon current interest and needs, and are announced in the preceding quarter. Prerequisite: permission of instructor.

URBDP 600 Independent Study or Research (*)

URBDP 700 Masters Thesis (*)

URBDP 800 Doctoral Dissertation (*)



College of Arts and Sciences

Dean

John B. Simpson

50 Communications

Divisional Deans

Richard J. Dunn—Humanities

Arthur Grossman—Arts

David Hodge—Computing, Facilities, and Research

Susan Jeffords—Social Sciences

Gary Christian—Natural Sciences

The departments and schools of the College of Arts and Sciences offer nearly 100 curricula leading to the degree of Bachelor of Arts, Bachelor of Fine Arts, Bachelor of Music, or Bachelor of Science, as well as graduate study leading to master's and doctoral degrees.

Undergraduate Study

Graduation Requirements

A liberal arts education entails mastery of certain basic skills, exposure to a broad range of academic disciplines, and concentration on a particular field of knowledge.

To be awarded a baccalaureate degree, therefore, a student in the College must fulfill requirements in the following areas: Language Skills, Reasoning and Writing in Context, Areas of Knowledge, and a Major. All required courses must be taken for a numerical grade. In addition, the student must present at least 90 credits outside the major department and must meet minimum GPA requirements as specified below. Detailed information on graduation requirements is provided in the *Bachelor's Degree Planbook*, available from the Undergraduate Advising Center, 9 Communications.

Language Skills

To receive a degree from the College of Arts and Sciences, students whose first enrollment in college (whether at the UW or elsewhere) was in autumn of 1985 or later are required to complete 5 credits of English composition with a minimum grade of 2.0. They must also complete course work through the end of the first-year college sequence in a foreign language, with at least a 2.0 in the third-quarter course, or demonstrate equivalent proficiency by passing an examination. Credits used for these two requirements (including the entire first year of foreign language, if taken) cannot also be applied to the Areas of Knowledge requirements described below.

Reasoning and Writing in Context

Students who first entered college autumn quarter 1985, or thereafter, must complete a minimum of 5 credits in Quantitative and Symbolic Reasoning (Q/SR) and 10 credits of courses that emphasize the development of writing skills in the context of an academic discipline. Q/SR and writing courses, if they apply, may

also count toward Areas of Knowledge or major requirements. The writing requirement is in addition to the English composition requirement mentioned in the preceding paragraph.

Areas of Knowledge

The Areas of Knowledge requirement is the means by which the student develops a breadth of knowledge. Undergraduate courses are currently divided into three large fields of knowledge: Visual, Literary, & Performing Arts; Individuals & Societies; and the Natural World. Each student must select at least 20 credits in courses from each of the three fields and an additional 15 credits from any courses in the three fields. Of the 75 total credits required, 15 may be from courses in the student's major department. As an alternative, students may fulfill all or part of this requirement by taking sequences in the College Studies Program. For a description of this program, see the Undergraduate Study section of this catalog.

Course Designators

The following symbols, included in course descriptions in this catalog, indicate which, if any, of the above requirements may be fulfilled by certain courses:

VLPA	Visual, Literary, and Performing Arts (Area of Knowledge requirement)
I & S	Individuals and Societies (Area of Knowledge requirement)
NW	The Natural World (Area of Knowledge requirement)
QSR	Quantitative, Symbolic, or Formal Reasoning
C	English composition

Courses that meet the foreign-language requirement and the additional-writing requirement are not marked. The third-quarter (or second-semester) course in any language meets the language requirement, so long as the entire first-year sequence totals at least 12 credits (regardless of whether the student earned credit for the earlier parts of the sequence). Consult the quarterly *Time Schedule* for writing-intensive courses that meet the additional-writing requirement.

For further explanation see *Undergraduate General Education Requirement Designators* on page 56 of this catalog.

Major

In fulfilling the requirements for a major, the student engages in thorough study of a discipline or subject, aimed at developing knowledge in depth. This part of the student's program is determined by the department, school, or faculty committee with which the major study is pursued. Measured in academic credits, the "major" required of each student consists of 50 or more prescribed credits in a department of the College or a closely related group of departments. Descriptions of major programs are printed below.

Minor

Completion of a minor, available through many departments, is optional. Requirements are shown under individual department undergraduate programs, below, or in a minors handout available in the Undergraduate Advising Center, 9 Communications.

Credits Required Outside Major Department

So that the student will not be tempted to overspecialize, the College limits to 90 the number of credits from a single department that the student may elect to count in the 180 credits required for the baccalaureate degree. A department itself may require no more than 70 credits from courses within the department, and no more than 90 credits from within the department and related fields combined, as constituting its major pro-

gram for the baccalaureate degree. Exceptions to these restrictions may be granted by the Dean.

GPA Required for Graduation

To be eligible to receive the baccalaureate degree, the student must achieve at least a 2.00 cumulative GPA in the major (some departments prescribe a higher minimum GPA for the major), as well as a 2.00 cumulative GPA for all work done in residence at the University.

Applying for Graduation

Students should apply for the baccalaureate degree no later than the first quarter of their final year. Seniors who apply by announced quarterly deadlines will receive Graduating Senior Registration Priority (GSP), allowing them to register first for the following quarter.

All students may graduate under the College requirements published in this catalog. Students may use the department requirements in effect at the time they are admitted to the major, if they graduate within 10 years of that time. Otherwise, the department may insist on more recent requirements. Students wishing to fulfill a previous set of requirements should see an adviser for details and options. All responsibility for fulfilling graduation requirements rests with the student concerned.

Limits on Physical Education and ROTC Courses Allowed Toward Graduation

A student graduating from the College of Arts and Sciences may count a maximum of three credits of 100-level physical education courses taken at the University of Washington, or their equivalents at other collegiate institutions, as elective credits toward graduation. At present, physical education courses are not offered at the University. Up to 18 credits in upper-division ROTC courses also may be counted as elective credits toward graduation, but no lower-division ROTC credits may be counted.

Evening Degree Program

Students may earn a degree in anthropology, business administration, communications, English, history, humanities, political science, psychology, social sciences, or sociology through the Evening Degree Program. Admission to the Program requires the following: 75 college credits, normally to include Arts and Sciences language skills requirements (English composition, one year of a single foreign language), the reasoning-in-context requirement (quantitative and symbolic reasoning), and a substantial portion of the writing-in-context and general education requirements. Students who have only a few remaining prerequisite courses to complete may, under certain circumstances, be admitted as premajors. Admission requirements for departmental majors in the Evening Degree Program—anthropology, business administration, communications (only the media studies option is offered), English, history, political science, psychology, sociology—are identical to requirements for the day programs, shown under departmental listings, below.

Major Requirements

Minimum 2.00 GPA for all courses taken in residence at the UW and minimum 2.25 GPA for courses taken to satisfy the major requirements.

Humanities—60 credits as follows: at least 30 credits from one of the following three tracks: communication and critical thinking; literature and culture; ideas and beliefs in social history; 5-credit senior seminar; remaining credits from courses outside the principal track.

Social Sciences—60 credits as follows: 15 credits of social science survey courses (e.g., ANTH 202, SOC 271, POL S 202); 25 credits from one of the following four tracks: social and ethical theory; law, politics, and

the state; culture and ethnicity; economy and ecology; 15 credits track electives (selected from courses outside the principal track); 5-credit senior seminar.

Major requirements are to include at least 40 credits in 300- and 400-level courses. For course lists, consult the Evening Degree Program adviser (at Evening Degree Program, 5001 25th Avenue NE) or the Undergraduate Advising Center (9 Communications).

Departmental Options—Requirements are the same as for day-school majors and are shown below in the undergraduate program section for each department.

Graduate Study

Students who intend to work toward advanced degrees must apply for admission to the Graduate School and must meet the general requirements outlined in the Graduate School section of this catalog, as well as the requirements established by the graduate faculty in the department or unit offering the degree program. Graduate students must satisfy the requirements for an advanced degree that are in force at the time the degree is to be awarded.

Afro-American Studies

See American Ethnic Studies.

American Ethnic Studies

B504 Padelford

The primary focus of the American Ethnic Studies major is to expose students to key content, methodologies, and theories in the comparative and interdisciplinary study of African Americans, Asian American, and Chicanos in the United States. The department also prepares students for entry into graduate and professional schools.

Undergraduate Program

Adviser
Marguerite Cook
A511 Padelford

Bachelor of Arts

Major Requirements: 55 credits to include 30 credits of core courses and 25 credits in a concentration. **Core:** 15 credits (AES 150, 151, 112). 10 credits (two courses from AFAM 201, AIS 201 or 203, AAS 205, CHSTU 201, to include one in the concentration and one outside the concentration. For Comparative American Ethnic Studies concentration, choose any two.) 5 credits (AES 495). **Concentration:** 25 credits in one of the following: Afro-American Studies, Asian American Studies, Comparative American Ethnic Studies. See department for list of concentration courses.

Faculty

Chair
James K. Morishima

Professors

Bereano, Philip L. * 1975, (Adjunct); JD, 1965, Columbia University; MPP, 1971, Cornell University; technol-

ogy assessment, social values, public policy technology: social values, citizen participation.

Butler, Johnella E. * 1987; EdD, 1979, University of Massachusetts.

Cauce, Ana Mari * 1986, (Adjunct); PhD, 1984, Yale University; social support and networks, at-risk adolescents, community psychology, minority populations.

Mizokawa, Donald T. * 1973; PhD, 1974, Indiana University; human development and cognition.

Morishima, James K. * 1960; PhD, 1967, University of Washington; human development and cognition.

Scott, Joseph W. * 1985; PhD, 1963, Indiana University; political sociology, family sociology, race/ethnic relations.

Walter, John C. * 1989; PhD, 1972, University of Maine; African American history, American women's history, the New Deal.

Associate Professors

Gamboa, Erasmo * 1976; MA, 1973, PhD, 1984, University of Washington; history, Chicano experience, Pacific Northwest.

Kashima, Tetsuden * 1976; PhD, 1975, University of California (San Diego); sociology.

Root, Maria P. P. 1990; MA, 1979, Claremont Graduate School; PhD, 1983, University of Washington; psychology of Asian Americans/multiracial couples.

Salas, Elizabeth 1987; MA, 1977, California State University, Los Angeles; PhD, 1987, University of California (Los Angeles); United States women's history, Chicano history.

Vasquez, James A. * 1975, (Adjunct); PhD, 1973, University of California (Los Angeles); learning (minority youth)/bilingual education.

Yee, Shirley J. * 1988, (Adjunct); PhD, 1987, Ohio State University; U.S. women's history, African-American history, nineteenth-century U.S. social history.

Assistant Professors

Feam-Banks, Kathleen A. 1990, (Adjunct); MS, 1965, University of California (Los Angeles); public affairs, risk communications.

Friaz, Guadalupe M. 1989; PhD, 1989, University of California (Berkeley).

Ginorio, Angela B. * 1981, (Adjunct); PhD, 1979, Fordham University; women and science, violence against women, sexual harassment, racial identity among Latinos.

Guerra, Juan C. 1990, (Adjunct); MA, 1983, PhD, 1992, University of Illinois; rhetoric and composition.

Twine, Frances Winddance 1994, (Adjunct); MA, 1990, PhD, 1994, University of California (Berkeley); racism/antiracism, multiracial/transracial identities, critical theory, Brazil, Britain and U.S.

Lecturer

Maulana, Seyed M. 1984; MUP, 1988, University of Washington.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

American Ethnic Studies

AES 150 Introductory History of American Ethnic Groups (5) I&S Gamboa, Salas Survey of the history of African Americans, Asian Americans, Chicanos, and American Indians in the United States.

AES 151 Introduction to the Cultures of American Ethnic Groups (5) I&S Survey of the cultures of

Chicano, African American, Asian American, and American Indian communities of the United States. Each group's culture is examined in its isolation and in its interaction with mainstream culture.

AES 212 Comparative American Ethnic Literature (5) VLPAI&S Butler Selected texts from the African American, American Indian, Asian American, Chicano/Latino, and Euro-American traditions of American literature. Examines the American Dream, identity, community, conformity, individualism, and family. Explores themes of assimilation, double consciousness, *mestiza* consciousness, and wholeness as an introduction to multiple American voices in literary expression.

AES 250 Race in the American University (5) I&S Racial integration in American institutions of higher education. Entry to, and impact on, American universities by people of color. History of ethnic studies and its relation to other disciplines. Recommended: 150, 151.

AES 251 Politics of Institutional Change (5) I&S Survey of ideologies, values, and structures of political and educational institutions. Emphasis on student experience in conceptualizing, designing, and implementing reforms in American political and educational institutions.

AES 275 Civil Rights (5) I&S Walter Examines the history of civil rights in the United States, focusing on efforts of the dispossessed to gain those rights. What are Civil Rights? How is the content of civil rights determined? What actions are open to groups excluded from those rights?

AES 321 Comparative American Fiction: Race and Ethnicity (5) VLPAI&S Butler Ethnic literature of the United States. Covers themes such as the immigrant experience, the migrant experience, becoming an American, and straddling several worlds, as we define self, wholeness, family, community, and nation. Explains how myths sustain us and images guide us as we encounter and express our American identity in literature.

AES 322 Race and Gender: Historical Perspectives (5) I&S The intersection of race and gender in the lives of women of color in the United States from historical and contemporary perspectives. Topics include racism, sexism, activism, sexuality, and interracial dynamics between women of color groups. Offered: jointly with WOMEN 322.

AES 333 Minorities in the Military (5) I&S Salas The experiences of racial minorities in the military. Topics include segregation of units, desegregation of military, career limitations and opportunities, minority women, military families, racism and role of veterans in civil rights struggles after service.

AES 350 Ethnic Minority Group Life in America (5) I&S Examines the sociological characteristics of ethnic minority group life in America. Covers American ethnic minorities, such as Japanese, Chinese, Filipino, Pacific Islander, Black Americans, Mexican Americans, and Native Americans.

AES 360 Political Economy of Race in the United States (5) I&S Asks the question, "Why do people accept unequal status?" Introduces explanations of the political and economic inequality of third world people in the United States, the accuracy of these explanations, and how they help or hinder efforts of these communities to improve their condition.

AES 361 Ethnicity, Business, Unions, and Society (5) I&S Scott Interrelationships of ethnicity, business, unions, and the larger society. Examines how the business and manufacturing sector is structured financially and sociologically, how this sector performs, and the consequences of these performances for selected ethnic groups in the United States. Prerequisites: introductory course in ethnic studies and either economics or sociology.

AES 363 Intellectual Foundations of Ethnic Studies (5) I&S Seeks to define the essence of a "discipline" and to locate ethnic studies on the spectrum of disciplines.

AES 364 American Ethnicity in the Twenty-first Century (5) I&S Through analysis of past and present literature and trends, examines the potential for extinction and/or preservation of ethnicity and ethnic American culture in twenty-first century America.

AES 461 Comparative Ethnic Race Relations in the Americas (5) I&S Sketches the ethnoracial systems operating in American society. Studies these systems as systems and examines their institutional and interpersonal dynamics. Compares ethnoracial systems in order to arrive at empirical generalizations about race/ethnic relations in the Americas. Offered: jointly with SOC 461.

AES 462 Comparative Race and Ethnic Relations (5) I&S Scott Race and ethnicity are examined as factors of social differentiation in a number of Western and non-Western societies in Europe, Africa, Asia, and the Americas. Recommended: AES/SOC 362. Offered: jointly with SOC 462.

AES 469 Ethnicity, Gender, and Media (5) I&S Media portrayal of women and people of color; creation of alternative media systems by women and people of color in the United States. Offered: jointly with CMU/WOMEN 469.

AES 494 Community Practicum and Internship (3-5, max. 10) Faculty supervised practicum and internship experience in variety of settings and agencies, e.g., ethnic specific agencies, government and civic community-based offices. Students contribute skills and knowledge to respective communities and gain experience by working with professionals and community organizers. Credit/no credit only. Recommended: AES major with junior or senior standing.

AES 495 Senior Seminar: Senior Thesis (5) I&S Focuses on the individual research topics of senior American Ethnic Studies majors. All students focus on a central comparative theme.

AES 498 Special Topics in American Ethnic Studies (1-5, max. 15) I&S Designed to provide the student an opportunity to concentrate on one specific aspect of American Ethnic Studies through a comparative, interdisciplinary approach.

AES 499 Independent Study or Research (1-5, max. 10) Independent readings and/or research under the supervision of a faculty member. Open to qualified students by permission of instructor.

Afro-American Studies

AFRAM 150 Afro-American History (5) I&S Introductory survey of topics and problems in Afro-American history with some attention to Africa as well as to America. Basic introductory course for sequence of lecture courses and seminars in Afro-American history. Offered: jointly with HSTAA 150.

AFRAM 200 Proseminar in Afro-American Studies (5) I&S Interdisciplinary survey of Afro-American Studies, presenting the unique Black perspective on the relevant disciplines in arts and sciences.

AFRAM 201 Introduction to Black Studies (5) I&S History, culture, religion, institutions, politics, economics, arts, and psychology of peoples of African descent as developed from experience in both the old and new worlds. Multidisciplinary analysis of social life from a Black perspective as illustrated in selected historical and contemporary writings.

AFRAM 211 Perspectives on African American Language (5) VLPA Aspects of the dialect spoken by the majority of Americans of African descent. History, linguistic description, and exploration of its artistic uses. Recommended: introduction to linguistics, Afro-American literature, and/or African literature.

AFRAM 212 Creative Expression for African-American Children (5) VLPA/I&S New and developing theories and practices of creative expression for African-American children. Students demonstrate techniques and practices learned.

AFRAM 214 Survey of Afro-American Literature (5) VLPA Butler A chronological survey of Afro-American literature in all genres from its beginnings to the present day. Emphasizes Afro-American writing as a literary art; the cultural and historical context of Afro-American literary expression and the aesthetic criteria of Afro-American literature. Offered: jointly with ENGL 258.

AFRAM 250 The Afro-American and the United States Supreme Court (5) I&S Laws passed by Congress, and the Constitution as interpreted by the Supreme Court, dealing with the conditions of Afro-Americans in the United States.

AFRAM 260 Black Male/Female and Family Relationships (5) I&S The Black family in the United States as a social institution. Effects of residence in a race-conscious society on interpersonal relationships between Black men and women. Exploration of proposals for strengthening the Black family in the United States. Offered: jointly with SOC 260.

AFRAM 261 The African American Experience Through Literature (5) VLPA/I&S Scott Instructs students in hermeneutical and sociological methods of analyses. Analyzes selected novels, essays, poems, short stories, and plays with the purpose of understanding the structures and functions of both society and personality. Offered: jointly with SOC 261.

AFRAM 270 The Jazz Age (5) I&S Walter Interdisciplinary study of the period after World War I to the Great Crash. Afro-American and Anglo-American currents and impulses that flowed together in the Roaring Twenties. Covers politics of normalcy, economics of margin, literature of indulgence and confusion, transformation of race relations, and cultural influence of jazz.

AFRAM 272 History of the South Since the Civil War (5) I&S Walter Reconstruction and its aftermath, the Agrarian (Populist) revolt, disfranchisement and segregation, the effects of urbanization and subsequent depression, desegregation, and the struggle for civil rights. Examines the New South, the conflict of ideology with structural and material change, and the place of the South in contemporary America.

AFRAM 306, 307, 308 Basic Swahili (5, 5, 5) Maulana Structure of spoken and written Swahili. Concentration on the acquisition of elemental conversational skill and an introduction to written texts of graded difficulty. Prerequisites: 306 for 307; 307 for 308.

AFRAM 309 Intensive Basic Swahili (15) Maulana First-year Kiswahili language. Introduces students to Kiswahili and allows them to explore and understand not only the language but also the diverse cultures and customs of the people of East Africa. Provides a basic foundation in speaking, reading, and writing. Primary emphasis on basic structure of Kiswahili and its operation. Offered: S.

AFRAM 320 Black Women in Drama (5) VLPA Character types of Black women as represented in plays by Black women. Some Black male playwrights are juxtaposed with Black female writers for comparative analysis. Playwrights include Georgia Douglas Johnson, Angelina Grimké, Alice Childress, Lorraine Hansberry, Ira Aldridge, LeRoi Jones. Prerequisites: 200, 212 or permission of instructor.

AFRAM 321 History of Afro-American Women and the Feminist Movement (5) I&S "Feminist Movement" from early nineteenth century to present. Treats relationship between Black and White women in their struggle for independence, at times together and at times apart. Discusses the reasons, process, and re-

sults of collaboration as well as opposition. Examines recent and contemporary attempts at cooperation. Offered: jointly with WOMEN 321.

AFRAM 323 African-American Women's History (5) I&S Yee Survey of African-American women's experience in United States, 1600 to present. Includes: social, political, economic status of Black women in slavery, freedom, education, activism, Civil Rights, women's rights, other social movements. Explores individual and collective interactions with African-American men, white men and women, other people of color. Offered: jointly with WOMEN 323.

AFRAM 330 The Social Psychology of the Black Community (5) I&S Internal dynamics of the African American community. Sociocultural factors influencing psychological development of African Americans; social origins, institutional formation, and impact of white racism; social stratification in, and the political economy of, the African American community; structural and psychological characteristics of domination; social determinants for social transformations.

AFRAM 334 The Sixties in America: Conflict, Confrontation, and Concession (5) I&S Walter Politico-cultural movements that collided in "The Elvis Decade," 1960-1972. Includes politics of confrontation and civil disobedience, economics of "guns and butter," literature of conflict and angst, polarization of the arts, transformation of race relations, role of Rock, and influence of domestic politics on foreign relations. Recommended: 150/HSTAA 150 and 270.

AFRAM 340 The Harlem Renaissance: A Literary Study (5) VLPA Highlights Harlem Renaissance—1912 through mid-1930's—as establishing a role for twentieth-century African American writer, encompassing literature, politics, and decolonization of the image of Africa, and solidifying integrationist and nationalist schools of thought. Examines images, themes, and characterizations in creating a literary aesthetic simultaneously American and African American.

AFRAM 358 Literature of Black Americans (5) VLPA Butler, Moody Selected writings—novels, short-stories, plays, poems—by Afro-American writers. The historical and cultural context within which they evolved. Differences between Afro-American writers and writers of the European-American tradition. Emphasis varies. Offered: jointly with ENGL 358.

AFRAM 370 Afro-American Political Thought (5) I&S Political ideologies and philosophies of pivotal Afro-American historical figures and the conditions under which these ideologies are developed, rejected, and transformed. How ideologies relate to solution of Afro-American political problems. Prerequisites: SOC 362 and PHIL 110 or permission of instructor.

AFRAM 401, 402, 403 Intermediate Swahili (5, 5, 5) VLPA Readings from prose to traditional poetry. Emphasis on acquiring an ability to manipulate ideas in Swahili. Review of structure. Prerequisites: 308 or equivalent for 401; 401 for 402; 402 for 403.

AFRAM 437 Blacks in American Law (5) I&S Walter Historical continuity for changing relationship between American jurisprudence and Black Americans, 1640-1986. Statutory and case law which determined role of Blacks in American society, and use of law by Blacks to gain civil and personal rights. Prerequisite: 271, 334, or upper level HSTAA. Recommended: junior, senior, or appropriate graduate standing.

AFRAM 480 Contemporary Issues in Afro-American Studies (5) I&S Five issues selected for their contemporary importance in Afro-American studies. Synthesis of different perspectives and approaches to the study of the Black experience. Prerequisites: senior standing and 201 or completion of Afro-American Studies core courses.

AFRAM 490 Research in the Black Community (1-5, max. 10) Identification and investigation of the

problems and needs of the Black community. Methods and alternatives of approaching these problems and needs. Students designate their areas of interest and subsequently pursue research and problem solving. Prerequisite: permission of instructor.

AFRAM 492 Special Topics in Afro-American Studies (3-6, max. 15) I&S Topics in which students and faculty have developed an interest as a result of work done in other classes or as a result of the need to investigate in greater depth Afro-American Studies issues. Topics vary. Prerequisite: 200 or permission of instructor.

Asian American Studies

AAS 205 Asian American Cultures (5) I&S Asian American subcultures; evolution of Asian American cultures in the United States from 1850 to 1950—immigration patterns, evolution of subcultures, evacuation, interracial relations, assimilation, and signs of social disorganization.

AAS 206 Contemporary Problems of Asian Americans (5) I&S Recent Asian American issues from 1950 to the present. Topics include ghetto communities, civil rights, identity problems and ethnicity, social organizations, political movements, and recent immigration.

AAS 210 Asian American Identity (5) I&S Examines the nature of Asian American identity from a multidisciplinary approach. Explores influences and manifestations of Asian American identity, using literature, history, and other texts. Topics to include gender issues, interracial relationships, and Amerasians. Prerequisites: 205, 206.

AAS 220 Asian American Stereotypes in the Media (5) I&S Asian stereotypes popularized by American literature, film, radio, and television and their effects on Asian American history, psychology, and community.

AAS 305 Asian American Cultures for Teachers (5) I&S Specially designed for teachers who wish to learn more about the history, culture, and current concerns of Asians in the United States. Implications for elementary and secondary school are considered. Prerequisite: permission of instructor.

AAS 350 Chinese American History and Culture (5) I&S Experience of the Chinese in America from 1850 to the present. Transformation from an immigrant to Chinese American community: immigration patterns, anti-Chinese movements, ethnic sociopolitical and economic institutions, community issues, Chinese American culture. Recommended: 205.

AAS 360 Filipino American History and Culture (5) I&S *Revilla* History and culture of the Filipino in America and the influence of an admixture of Filipino, Spanish, and American traditions on the Filipino immigrant and his or her descendants. Recommended: 205.

AAS 370 Japanese American History and Culture (5) I&S Historical roots and subsequent changes in the Japanese American group examined through an interdisciplinary approach. Topics include historical events, culture, values, social and community structures, institutions, occupations, and future orientations. Recommended: 205.

AAS 372 Internment Camps in North America: United States and Canada (6) I&S Comparative study of United States and Canadian internment camps incarcerating Japanese Americans and Japanese Canadians during World War II. Focuses on early history, dislocation and internment, effects (disorganization and adjustments), effects on the internees and society, and present situation.

AAS 375 The United States Supreme Court and Asian America (5) I&S Covers relevant decisions of the United States Supreme Court related to Asian Americans, examines the effects of those decisions on

that ethnic group. Includes evolving notions of equal protection, due process and relevant statutes such as the 1964 Civil Rights Act. Prerequisites: 205, 206, 370.

AAS 380 Asian American Communities and Social Policies (5) I&S History, culture, social organization, leadership patterns and interethnic relations of Asian American (Chinese, Filipino, Japanese, and Korean) communities. Origins and impact of social policies relevant to Asian American communities. Prerequisite: 205 or equivalent or permission of instructor.

AAS 385 Asian Americans: The Law and Immigration (5) I&S Traces the evolution of United States immigration law and policy from the nineteenth century to modern day, from free immigration to immigration restriction, through the elimination of race as a criterion, and culmination in the passage of the Simpson-Mazzoli bill. Prerequisites: 205, 206.

AAS 390 Asian American Family and Personality (5) I&S Examines the changes of Asian American family patterns through successive generations from the late 1800s to the present. The influence of Asian culture, Asian American experience, family patterns, and racial discrimination examined to understand their impact on the personality of Asian Americans. Prerequisite: 205 or 206.

AAS 392 Asian American Women (5) I&S History of and contemporary issues related to Asian American women in the United States. Prerequisite: 205 or 206. Offered: jointly with WOMEN 392.

AAS 395 Southeast Asian Americans: History and Culture (5) I&S **AAS 401 Asian American Literature to the 1940's (5) VLP** Asian American literature from nineteenth-century immigrants to the 1940's. Emphasis on Chinese, Japanese, and Filipino writings detailing the experience and sensibility of first generation immigrants. Early twentieth-century writing focus on the development not only of Asian American community, but also of second generation American-born Asian American writers.

AAS 402 Contemporary Asian American Literature (5) VLP Asian American literature from the 1940s to the present. Emphasis on the development of attitudes and identities in contemporary Asian American literature, the role of the writer in a minority culture, and the relationship of literature to self and society. Recommended: 401.

AAS 403 Survey of Asian American Poetry (5) VLP Asian American poetry, nineteenth century to present. Readings include poetry of the early immigrant to America, cultural imperatives transferred from old world to new world, and establishment of an Asian American identity in poetry from 1870's through 1890's. Prerequisites: ENGL 104-105 or either ENGL 111, 121, or 131.

AAS 488 Special Topics (5, max. 10) I&S Prerequisite: 205 or permission of instructor.

AAS 489 Undergraduate Independent Study (1-6, max. 10) Prerequisites: 205 or equivalent and permission of instructor.

Chicano Studies

CHSTU 200 Latinos in the United States (5) I&S *Gamboa, Salas* Historical, social, and economic experience of Latinos in the United States. Major themes include education, labor, class, and gender identity. Analyzes rapid growth of old and newly established Latino communities, based on emigration from Latin America.

CHSTU 201 Introduction to Chicano Studies (5) I&S *Friaz, Gamboa, Salas* Selected themes in Chicano experience; studies in Chicano politics and Chicano socioeconomic concerns.

CHSTU 202 Intermediate Chicano Studies (3) I&S *Gamboa* Follows 201. Further understanding of selected themes in Chicano experience; studies in

Chicano politics and Chicano socioeconomic concerns.

CHSTU 207 Chicano Consumer: Past and Present (3) I&S Coordinates Chicano economic history with contemporary economic problems of Chicanos; emphasizing social, psychological, and financial aspects that deprive the Chicanos of their economic freedom.

CHSTU 254 History of Chicanos in Washington State (5) I&S *Gamboa* History, extent, and results of the Chicano presence from earliest Spanish explorations to the present; contemporary problems of Chicanos in a broader national context.

CHSTU 255 Mexican Women: Past and Present (5) I&S *Salas* Survey of women in Mexican society from Meso-American times to the 1940s.

CHSTU 256 Chicanas: Gender and Race Issues (5) I&S *Salas* Contemporary issues in the Chicana movement since the 1940s. Issues range from feminism and Chicana political, educational, and social organizations, to work, family, health, and the arts.

CHSTU 260 Introduction to Chicano Politics (5) I&S Surveys the political position and activities of Mexican-American peoples in the United States from two perspectives: (1) Chicanos as objects of the political process of United States life, (2) contributions of the Chicano people to United States politics.

CHSTU 330 Chicanos Themselves (5) I&S Explores the issue of Chicano, or Mexican-American, identity. Examines statements of selfhood by Chicanos, studied in order to understand the relationship between individual and society in creating identity.

CHSTU 352 Mexican Immigration: A Comparative Analysis (5) I&S *Gamboa, Salas* Examines and compares constant Mexican immigration with that of other immigrants to the United States as one of the most important issues confronting Chicanos and other Americans in the United States.

CHSTU 354 Latinos in the United States Labor Market (5) I&S Role of Mexican American, Puerto Rican, Cuban American, Central and South American wage earners in United States labor market. Institutional approach to study of markets. Analyzes effects of educational system, market discrimination, labor unions on economic outcomes for Latino men and women. Prerequisite: 201, 200, 260, or AES 350.

CHSTU 356 The Chicano Family (5) I&S *Salas* The historical, psycho-social, and sociocultural role of the Chicano family from Meso-American times to the present.

CHSTU 391 Independent Study (1-6, max. 10) *Friaz, Gamboa, Olguin, Salas* Students work individually or in teams. Prerequisite: permission of instructor.

CHSTU 405 Advanced Chicano Studies (5) I&S *Gamboa* Chicano culture as related to current values and health practices, Mexican labor and immigration in both historical and contemporary setting. Chicano politics 1848 to present. Recurrent problems of Chicanos in society; social movement for acceptance and for self-determination.

CHSTU 484 Chicana Expressive Culture (5) VLP/I&S Expressive culture of Mexican women in United States. Cultural and artistic practices in home, film, literary, performing, and visual arts. Focuses on ways Chicana visual artists re-vision traditional iconography. Prerequisites: 303, 322, and one additional 300-level course beyond 303 or permission of instructor. Offered: jointly with SPAN 484/WOMEN 484.

CHSTU 491 Special Topics in Chicano Studies (3-6, max. 10) I&S *Friaz, Gamboa, Olguin, Salas* Interdisciplinary course concentrating on one or more aspects of the Chicano experience.

CHSTU 494 Community Practicum and Internship (3-5, max. 10) Faculty-supervised practicum and internship experience in variety of settings and agencies, e.g., ethnic specific agencies, Higher Education Coordinating Board, government and civic community based offices. Students contribute newly acquired skills and knowledge to respective communities and gain experience working with professionals and community organizers. Recommended: junior or senior AES major.

American Indian Studies

C514 Padelford

The American Indian Studies Center, affiliated with the Department of Anthropology, offers courses focusing on American Indian cultures, perspectives, and problems, with the goal of enriching the liberal education of the general student. The curriculum offers courses in the humanities and social sciences. A diversity of courses surveys Indian cultural developments in art, music, language, and literature and offers performance and studio experience. Other courses explore the historical and contemporary interaction of Indians in American society and the application of social science theories to Indian societies and institutions. Since American Indians have been such an integral part of the historical, cultural, and legal development of this country, these courses provide students with an opportunity to broaden their understanding of their ethnic origins.

Major requirements: A major emphasizing American Indian Studies is available through the Department of Anthropology. All AIS courses except AIS 102 may count toward that major. No more than 6 credits of any combination of AIS 253 and AIS 350 may be counted toward the major.

Minor

Minor Requirements: Minimum 25 credits to include 10 credits of introductory course work in American Indian studies; 9-15 credits of course work on Native American ethnology, archaeology, history, or governmental relations; and 6-10 credits of course work in art, art history, music, or literature. See adviser for approved course options. Students majoring in anthropology may also minor in American Indian studies, so long as no credits are counted for both.

Faculty

Director

James Nason

Professors

Findlay, John M. * 1987; PhD, 1982, University of California (Berkeley); history of the American West.

Hunn, Eugene S. * 1972; PhD, 1973, University of California (Berkeley); cognitive anthropology, ethnobiology, cultural ecology and evolution, North American Indians.

Hutterer, Karl L. * 1990; PhD, 1973, University of Hawaii; prehistory, ethnology of Southeast Asia, East Asia.

Nason, James * 1970; PhD, 1970, University of Washington; sociocultural anthropology, museology, material culture, cultural heritage, Micronesia, North America.

Smith, Eric A. * 1980; PhD, 1980, Cornell University; ecology, evolutionary theory, hunter-gatherers, demography, Native Americans, Canadian Inuit.

Stein, Julie K. * 1980; MA, 1976, PhD, 1980, University of Minnesota; New World archaeology, Northwest coast archaeology, geoarchaeology, shell middens.

White, Richard * 1990; PhD, 1975, University of Washington; American West, American Indian, environmental history.

Witherspoon, Gary J. * 1987; PhD, 1970, University of Chicago; language, art and history of the Southwest.

Associate Professors

Hollow, Walter B. 1978; MD, 1975, University of Washington; Native Americans: health issues, health services research, role of traditionalism in chronic disease.

Oliver, Marvin E. 1974; MFA, 1973, University of Washington; Northwest coast Indian art, Native American art, wood design, glass, metals.

Assistant Professors

Bending, Raymond L. 1987; PhD, 1992, University of Washington; American Indian child welfare practice and policy, social work in American Indian communities.

Harmon, Alexandra J. 1991; JD, 1972, Yale University; MA, 1990, PhD, 1995, University of Washington; American Indian history and law, history of American West and Pacific Northwest.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

AIS 110 Musical Traditions of Native North America (3) VLPA Diverse musical traditions of Native North America. Examines historical and contemporary music related traditions within the following areas: Northwest Coast, Arctic, Southwest, Great Basin, Plateau, Plains, and Eastern Woodlands. Emphasis on listening, identification, and exploration of the relationships between music and culture.

AIS 113, 114, 115 American Indian Language: Navajo (5, 5, 5) Witherspoon Conversation, reading, and writing in Navajo. Oral literature and other aspects of Navajo culture integrated into language study. Prerequisites: 113 for 114; 114 for 115.

AIS 151 Indian Art of Northwest Coast (3) VLPA Oliver Studio course on Pacific Northwest coast Indian/Eskimo art. Traditional and contemporary forms; principles of form, style, and techniques; values that influence Indian/Eskimo art styles.

AIS 170 Survey of North American Indian Art (5) VLPA Major Indian art traditions of North America. Precontact and early-contact-era traditions and the evolution of Indian art forms in contemporary times. Design and techniques in Indian art.

AIS 201 Introduction: Ethnohistory of Native North America (5) I&S Survey of Native American cultural origins/histories from archaeological, historical, and native perspectives: presents traditional creation accounts and oral histories, archaeological and ethnohistorical evidence. Focus on cultural dynamics-change and continuity through prehistoric, proto-historic, colonial, and American periods.

AIS 202 Introduction to Contemporary Experience in Indian America (5) I&S Survey of contemporary Native American people, cultures, and issues. Focus on modern experiences through readings from Native American autobiographies, contemporary narratives and literature, and reports of important topical issues, e.g., water rights, Indian gaming, treaty law.

AIS 203 Introduction: Philosophical and Aesthetic Universes (5) I&S Social constructions of reality, aesthetic as well as imaginative, as conceptualized by approximately five traditional American Indian cultures from different regions of North America.

AIS 240 Native North American Women (5) I&S Bentz Indian women in the social structure; historical and contemporary roles; changes in male-female relationships; problems and opportunities of contemporary women; the feminist movement and Indian rights.

AIS 253 Wood Design (3, max. 9) VLPA Oliver Studio course in wood sculpture utilizing Pacific Northwest Indian hand tools. Properties of woods and their uses.

AIS 311 North American Indians: Pacific Northwest (5) I&S Traditional societies of the Pacific Northwest from southern Alaska to northern California; significant areal features, such as rank, totemic crests, guardian spirits, the potlatch, fishing, and foraging illustrated by comparisons and by selected ethnographic sketches. Continuity between past and present. Prerequisite: ANTH 100 or 202 or permission of instructor.

AIS 312 North American Indians: The Intermountain West (5) I&S Traditional cultures of Columbia and Fraser Plateau region and Great Basin: Interior Salish, Sahaptin and Nez Perce, Paiute, and their neighbors. Regional features of language, ecology, social life, myth, religion. Contemporary issues of reservation life, government, ethnic conflict in historical perspective. Recommended: ANTH 100 or 202.

AIS 316 North American Indians: The Southeast to 1850 (5) I&S Emphasis on prehistory, social organization, belief system, political alliances. European contact, effects of plantation slavery and slave trade on Indians, issues of ethnicity, and consequences of removal policies.

AIS 317 North American Indians: The Southwest (5) I&S Witherspoon Overview of history and ethnography of the Southwest with emphasis on Apacheans, Pueblos, and Pimans/Yumans. Social organization, religion, worldview, and expressive culture of such specific groups as Navajo, Hopi, Zuni, Tewa, and Papago. Prerequisite: ANTH 100 or 202.

AIS 330 United States-Indian Relations (5) I&S Witherspoon Trends in interrelations of native Americans and European immigrants since 1500. Current problems in Indian-White relationships examined in historical context. Development of Indian policy and consequences of major legislative acts, including the Allotment Act, Indian Reorganization Act, termination and relocation. Implications for contemporary Indian education, religion, and health.

AIS 335 Legal Problems of the American Indian (5) I&S Legal status of the American Indian with emphasis on the reservation; heirship, land ownership and use; mineral, water, fishing, and hunting rights; and problems related to self-determination.

AIS 340 Indian Children and Families (5) I&S Bentz Cross-cultural survey of Indian child rearing, family structure, and related social issues. Includes historical changes in family structure, value orientation and adaptation to a bicultural environment, education, child welfare, health problems, and aging.

AIS 350 Two-Dimensional Art of the Northwest Coast Indians (3, max. 9) VLPA Oliver Studio course emphasizes principles of structure and style of two-dimensional art which can be found on many old, traditional Northwest Coast pieces, such as painted storage boxes and chests, house panels, and ceremonial screens. Students apply these principles in creating a variety of graphic projects.

AIS 377 Contemporary American Indian Literature (5) VLPA Creative writings-novels, short stories, poems-of contemporary Indian authors; the traditions out of which these works evolved. Differences between Indian writers and writers of the dominant European/American mainstream. Offered: jointly with ENGL 359.

AIS 431 History of American Indian Education (5) I&S Traditional and European-introduced methods of

schooling, the federal role in Indian education, and contemporary Indian education issues. Special attention to Indian concepts of learning; boarding school education; the role of the Bureau of Indian Affairs; current trends in bilingual and bicultural education for Indians.

AIS 450 American Indian Song and Dance Tradition: Performance (3) VLPA Performance of various American Indian social dances, songs, and games. In-depth study of various American Indian vocal styles.

AIS 466 Special Studies in American Indians (3, max. 6) I&S Delineation and analysis of a specific problem or related problems in American Indian Studies. Offered occasionally by visitors or resident faculty. Prerequisite: permission of instructor.

AIS 475 Special Topics in Indian Studies (1-5, max. 15) I&S Current research and readings in American Indian Studies content areas.

AIS 499 Independent Study (1-5, max. 15) Readings and/or research under faculty supervision.

Anthropology

M32 Denny

Anthropology is the study of the physical, cultural, and social development; comparative biology; and variation in the customs and beliefs of human beings. The primary fields within the discipline include archaeology, biocultural anthropology, and sociocultural anthropology, with anthropological linguistics being included in the latter. All of these fields are represented in the department's curriculum and in the faculty's research.

Undergraduate Program

Director of Student Services
Diane Guerra
243 Denny

Bachelor of Arts

Major Requirements: BIO A 201, any two ANTH-prefix courses numbered 200 through 210, ARCHY 205; one of the following: STAT 220, STAT 311, Q SCI 381, BIOS 472; 30 additional credits in anthropology selected from both upper- and lower-division courses, but excluding ANTH 100, AIS 102, ARCHY 105, and BIO A 100, which may not be counted toward the major. No more than 6 credits from any combination of AIS 253 and AIS 350 may be counted toward the major. At least 25 credits in the major must be with the grade of 3.0 or above. Courses in which a grade of 1.9 or less is received may not be counted toward the 55 credits required. Transfer students must complete a minimum of 15 upper-division credits in anthropology at the UW. Required courses in anthropology taken by transfer and returning students more than 10 years past must be repeated; in limited circumstances, this requirement may be waived by petition to the departmental undergraduate adviser. Students who plan to undertake graduate work should elect one foreign language.

Minor

Minor Requirements: 30 credits (at least 15 credits at upper-division level) from courses with the following prefixes: ANTH, ARCHY, BIO A, and AIS. ANTH 100 can be counted but is not required. Minimum grade of 2.0 required in each course. Students majoring in anthropology may also minor in American Indian Studies, so long as no course credits are counted for both.

Graduate Program

David H. Spain, Graduate Program Coordinator

The department recognizes three principal subfields of anthropology within its faculty, programs, and curriculum: archaeology, biocultural anthropology, and sociocultural anthropology (including anthropological linguistics). The department offers three distinct Ph.D. programs within the subdisciplines and an M.A. program in biocultural anthropology. A Ph.D. program in sociocultural anthropology with emphasis in ethnomusicology is offered in cooperation with the School of Music. The M.A. degree may be earned within the Ph.D. programs as a thesis or nonthesis degree. Graduate students are admitted to, and specialize in, their chosen subfields from the beginning of their graduate studies.

Admission Requirements

Applicants are admitted to begin study only during autumn quarter and are advised to have their application materials completed by the beginning of the prior January. A complete application file includes the Graduate School Application, two official transcripts, the Supplementary Information Form, three recommendations, a statement of purpose, and scores from the Graduate Record Examination (GRE). Foreign students (except for those from English-speaking countries) are required to take the TOEFL exam as well as the GRE.

Program Requirements

For each of the respective graduate programs, completion of the core requirements and a reading knowledge of one foreign language are required. Under the guidance of a supervisory committee selected from his/her subfield, the student shapes an individual program. The major areas emphasized in the faculty and curriculum are: North America, Africa, Japan, China, Southeast Asia, and Oceania. The M.A. programs usually require two years of graduate study; the Ph.D. programs usually require at least three years beyond the master's level, including a year of independent field research and a year to organize field materials and write a doctoral dissertation.

Financial Aid

Fellowships are awarded to a few outstanding entering students. A limited number of teaching and research assistantships and hourly positions are offered primarily to advanced students. Some students may be qualified for a few National Resource Fellowships for Language Studies. The Ronald J. Olson Fellowship provides resident tuition for three quarters to an entering student with interests in Native North America. Work study positions are also available for eligible graduate students.

Correspondence and Information

Graduate Program
Department of Anthropology, Box 353100

Faculty

Chair

Stevan Harrell

Professors

Chrisman, Noel J. * 1973, (Adjunct); Ph.D. 1966, University of California (Berkeley); community partnership research, clinical cultural competence, ethnic health beliefs and practices.

Dunnell, Robert C. * 1967; Ph.D. 1967, Yale University; archeological theory, field method, eastern North America.

Grayson, Donald K. * 1975; Ph.D. 1973, University of Oregon; North American prehistory, paleoecology, vertebrate faunal analysis, history of archaeology.

Harrell, Stevan * 1974; Ph.D. 1974, Stanford University; family systems, demography, social evolution, religion, China, Taiwan.

Hunn, Eugene S. * 1972; Ph.D. 1973, University of California (Berkeley); cognitive anthropology, ethnobiology, cultural ecology and evolution, North American Indians.

Hutterer, Karl L. * 1990; Ph.D. 1973, University of Hawaii; prehistory, ethnology of Southeast Asia, East Asia.

Keyes, Charles F. * 1965; Ph.D. 1965, Cornell University; ethnic group relations, sociology of Theravada Buddhism, mainland Southeast Asia.

Lockard, Joan S. * 1974, (Adjunct); Ph.D. 1963, University of Wisconsin; primate social behavior, animal behavior, sociobiology, human ethology, neurobehavior.

Nason, James * 1970; Ph.D. 1970, University of Washington; sociocultural anthropology, museology, material culture, cultural heritage, Micronesia, North America.

Newell, Laura L. * 1957; Ph.D. 1967, University of Washington; primatology growth and development, human biology, evolutionary aspects of dermatoglyphics.

Nute, Peter E. * 1970, (Emeritus); Ph.D. 1969, Duke University; genetics and evolution.

Sakata, Hiromi L. * 1977, (Adjunct); MA, 1968, Ph.D. 1976, University of Washington; ethnomusicology.

Smith, Eric A. * 1980; Ph.D. 1980, Cornell University; ecology, evolutionary theory, hunter-gatherers, demography, Native Americans, Canadian Inuit.

Spain, David H. * 1968; Ph.D. 1969, Northwestern University; psychocultural anthropology, African studies, research methods.

Stein, Julie K. * 1980; MA, 1976, Ph.D. 1980, University of Minnesota; New World archaeology, Northwest coast archaeology, geoarchaeology, shell middens.

van den Berghe, Pierre L. * 1965; Ph.D. 1960, Harvard University; comparative sociology, stratification, race and ethnic relations, kinship, sociobiology.

Wenke, Robert J. * 1975; Ph.D. 1975, University of Michigan; archaeology of Egypt, the Middle East, and quantitative methods.

Winans, Edgar V. * 1957; Ph.D. 1959, University of California (Los Angeles); politics, economics and law, Africa, the developing world.

Witherspoon, Gary J. * 1987; Ph.D. 1970, University of Chicago; language, art and history of the Southwest.

Associate Professors

Anagnost, Ann S. * 1990; Ph.D. 1985, University of Michigan; ethnography of the state, ideology and popular culture, peasant society; China.

Eck, Gerald G. * 1974; Ph.D. 1977, University of California (Berkeley); primate paleontology, especially African Pliocene-Pleistocene monkeys and hominids.

Ellingson, Terry J. * 1983, (Adjunct); Ph.D. 1979, University of Wisconsin; MA, 1979, University of Chicago; ethnomusicology.

Horn, Beverly M. * 1976, (Adjunct); Ph.D. 1975, University of Washington; cross-cultural research in maternal-child nursing.

Ivy, Marilyn J. * 1992; Ph.D. 1988, Cornell University; contemporary critical theory, anthropology of modernity, Japanese culture, politics and history.

Jacobs, Sue-Ellen * 1974, (Adjunct); Ph.D. 1970, University of Colorado (Boulder); anthropological studies of women, applied anthropology, ethnohistory, Native North America.

Kahn, Miriam * 1986; PhD, 1980, Bryn Mawr College; museology, ecology, agricultural development, food symbolism, gender relations, Malaysia and Oceania.

Leonetti, Donna * 1978; PhD, 1976, University of Washington; biological and sociocultural interactions in population adaptation, epidemiology, Japanese Americans.

Oliver, Marvin E. 1974; MFA, 1973, University of Washington; Northwest coast Indian art, Native American art, wood design, glass, metals.

Rhodes, Lorna A. * 1983; PhD, 1973, Cornell University; medical anthropology, symbolic anthropology, South Asia, religion, psychiatry.

Sorensen, Clark W. * 1989, (Adjunct); PhD, 1981, University of Washington; Korea, social change in East Asia, development, ethnic identity.

Waterman, Christopher * 1985, (Adjunct); PhD, 1986, University of Illinois; ethnomusicology.

Assistant Professors

Close, Angela E. 1995; MA, 1974, PhD, 1976, Cambridge University (UK); archaeology of North Africa.

Fox, Aaron A. 1994; PhD, 1995, University of Texas (Austin); linguistic anthropology, ethnomusicology, working-class culture, rural U.S.

Hagstrum, Melissa 1991; PhD, 1989, University of California (Los Angeles); New World complex societies, household archaeology, craft specialization, ceramics.

Harmon, Alexandra J. 1991; JD, 1972, Yale University; MA, 1990, PhD, 1995, University of Washington; American Indian history and law, history of American West and Pacific Northwest.

Pemberton, John * 1992; PhD, 1989, Cornell University; colonial/postcolonial historiography, cultural politics, Indonesian studies.

Shell-Duncan, Bettina 1995; MS, 1988, University of Wisconsin; PhD, 1994, Pennsylvania State University; determinates of child survival.

Tracer, David * 1991; PhD, 1991, University of Michigan; biological anthropology, human ecology, fertility, nutrition, adaptation, Melanesia.

Twine, Frances Winddance 1994, (Adjunct); MA, 1990, PhD, 1994, University of California (Berkeley); racism/antiracism, multiracial/transracial identities, critical theory, Brazil, Britain and U.S.

Senior Lecturer

Green, James W. * 1975; PhD, 1972, University of Washington; cross cultural, mental health, comparative aging, religion, West Indies, Pakistan, Islam.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

General

ANTH 100 Introduction to Anthropology (5) I&S Introduction to the subfields of archaeology, biocultural anthropology, and sociocultural anthropology through the examination of selected problems in human physical, cultural, and social evolution. Not recommended for students who have had other courses in anthropology, archaeology, or biocultural anthropology. May not be counted toward the 55 credits required for the major in anthropology. Offered: AWSp.

Sociocultural Anthropology

ANTH 202 Principles of Sociocultural Anthropology (5) I&S Comparison of lifeways of various non-

Western and Western peoples. Introduction to basic theories and methods used in the field.

ANTH 203 Introduction to Anthropological Linguistics (5) VLPA/I&S Linguistic methods and theories used within anthropology. Descriptive and theoretical linguistics compared; historical linguistics and comparative method; sociolinguistics; language and culture; human language and animal communication compared; survey of history of anthropological linguistics in North America. Offered: jointly with LING 203.

ANTH 208 The Cultural Animal (5) I&S/NW Examination of the interaction between biology and culture in shaping human social behavior. Basic principles of natural selection, gene-environment interaction, cultural transmission, learning, and cultural evolution; application of these to various topics, including gender, violence, politics, kinship, and religion.

ANTH 216 Oceania (3) I&S Contemporary and traditional life in the Pacific Basin.

ANTH 230 Comparative Tribal Religion (5) I&S World's "folk" or "little traditions" of religious belief and practice. Cosmologies, eschatologies, notions of causality and of human nature. "Little traditions" as examples of man's imaginative attempts to create a relatively closed, knowable, and more-or-less manageable cosmos.

ANTH 301 Human Nature and Culture (3) I&S Comparison of various anthropological perspectives on the sources of variation in customs, values, and beliefs of human groups, including non-Western peoples and contemporary Americans.

ANTH 305 Anthropology of the Body (5) I&S Biosociocultural approach to the human body as universal object—and agency—for human minds. How cross-cultural contrasts in ways of construing the body affect self-regard and social interaction. Body shapes, sizes, colors, exordia, signals, symbolism, aesthetics, metaphysics, rituals, lore, and politics.

ANTH 306 Representations of the Pacific Islands and Islanders (3) VLPA/I&S Kahn Explores written texts and visual images about the Pacific Islands and Islanders in an effort to understand the power of representation and its relationship to the construction of knowledge. Examples drawn from early explorers, artists, novelists, anthropologists, the tourist industry, and Pacific Islanders.

ANTH 310 Native North American Societies (5) I&S Smith Traditional cultures of America north of Mexico, emphasizing diversity of North American Indian and Eskimo societies. Origins of Native American culture areas and language groupings; subsistence systems; levels of social organization; European conquest and colonialism; and description of representative cultures from the ten culture areas. Recommended: 100.

ANTH 313 Peoples of Africa (5) I&S Survey of the many cultures of pre- and post-colonial sub-Saharan Africa. Appreciation of the adaptability, strength, and creativity of African peoples. Recommended: 100.

ANTH 314 Civilization of Island Southeast Asia (5) I&S Pemberton Cultural, political, economic traditions of insular Southeast Asia, Indonesia, Malaysia, the Philippines. Early Indianized states; growing influence of Islam; Western European conquests; developed colonial societies, their legacies; modern nationalism, problems faced by newly independent states; important cultural continuities. Prerequisite: one 200-level International Studies or anthropology course, or permission of instructor. Offered: jointly with SISSE 314.

ANTH 315 Southeast Asian Civilization: Buddhist and Vietnamese (5) I&S Keyes Civilizations of Theravada Buddhist societies in Burma, Thailand, Cambodia, and Laos and in Vietnamese societies of Southeast Asia. Culture of tribal peoples who live on peripheries of these societies. Cultural transformations

consequent upon the war in Indochina and resettlement of Indochinese refugees in United States. Offered: jointly with SISSE 315.

ANTH 318 Peoples and Cultures of the Islamic Middle East (3) I&S Survey of cultures and peoples of Islamic Middle East and North Africa. First half of the course emphasizes the integration of peasant, urban, and nomadic societies in the traditional culture and economy; the second half concentrates on the transformation of the traditional life styles through the process of westernization and modernization.

ANTH 321 Introduction to the Anthropological Study of Religion (3) I&S Comparative study of religion as approached by anthropologists. Primarily for non-anthropology majors. Recommended: RELIG 201 or 202.

ANTH 322 Comparative Study of Death (5) I&S Death analyzed from a cross-cultural perspective. Topics include funerary practices, concepts of the soul and afterlife, cultural variations in grief, cemeteries as folk art, and medical and ethical issues in comparative context. American death practices compared to those of other cultures.

ANTH 325 Anthropology of Japanese Religion (5) I&S Introduction to major themes in Japanese religion, emphasizing contemporary social contexts in urban and rural Japan. Topics include Shinto and Buddhist practices, the place of nature, ancestors, magic, shamans and mediums, gender and religion, religion and nationalism, new religions.

ANTH 331 Northwest Coast Indian Art (5) VLPA/I&S Native American art of the Pacific Northwest Coast from precontact to the present, from the Columbia River in the south to Southeast Alaska in the north. Differences in tribal styles and social functions; changes occurring over time as the result of sharing between tribal groups and the impact of the arrival of Europeans. Offered: jointly with ART H 331.

ANTH 350 Cultural Evolution (3) I&S Evolution of culture and society with emphasis on ecology. Development of urban life in light of common and distinctive character of cities, peasantries, and tribal groups or bands. Process of urbanization, disappearance of truly primitive peoples, emergence of peasant, rise of a world system. Selected case studies, past and present.

ANTH 351 Women of the African Diaspora (5) I&S Twine Cross-cultural comparative analysis of African descent women in an international context. Topics include racism, post-colonialism, immigration, occupational segregation, transnational identities, and media representations. Prerequisites: 200 and 205. Offered: jointly with WOMEN 351.

ANTH 352 Buddhism and Society: The Theravada Buddhist Tradition in South and Southeast Asia (5) I&S Introduction to the religious tradition of Theravada Buddhism (as practiced in Sri Lanka, Burma, Thailand, Laos, and Cambodia) and examination of the variations in ethical orientations developed through Theravada Buddhist ideas. Recommended: RELIG 202 or knowledge of one Eastern religious tradition. Offered: jointly with RELIG 350.

ANTH 353 Anthropological Studies of Women (5) I&S Cross-cultural and comparative survey of the varieties of women's cultural experiences, statuses, and roles in cultural context and the anthropological theories used to account for them. Topics include: biological factors, studies of primates, woman the gatherer, work in preindustrial and industrial societies, patriarchy and matrilineal kinship, childbirth, and women's roles in economic development. Prerequisites: 200 or permission of instructor. Offered: jointly with WOMEN 353.

ANTH 354 The Comparative Study of Societies (5) I&S Compares entire societies at various levels of technological complexity to explore problems of their

development and structural organization. Examines both historical and contemporary, and Western and non-Western societies. Prerequisite: SOC 110. Offered: jointly with SOC 354.

ANTH 355 Aging in Crosscultural Perspective (3) I&S Survey of strategies for dealing with the fact of aging in various sociocultural systems. Relates the varieties of cultural solutions to the theories on aging, drawn from psychology and medicine, with emphasis on non-Western societies. Prerequisite: one 200-level ANTH course or permission of instructor.

ANTH 356 Visual Anthropology (3) I&S The place of photography and films in ethnography; their use in the documentation and interpretation of cultural and social systems.

ANTH 357 Text and Performance in Island Southeast Asia (5) VLPS/I&S Poetics and politics of narrative practice and aesthetic form in Indonesia, the Philippines, Malaysia, and Singapore. Introduction to a range of performance scenes (theatrical, magical, musical, cinematic) and textual sources (religious inscription, epic poetry, traditional literature, modern fiction) informing the extraordinarily diverse cultural histories of these countries.

ANTH 358 Culture and Cognition (5) I&S/NW Surveys anthropological theories and research on the relationship between language, thought, and behavior. Examines the influence of cultural inheritance on perception, classification, inference, and choice. Describes relevant cross-cultural research methods and evaluates theoretical models used by cognitive anthropologists. Prerequisite: 203 or PSYCH 355 or permission of instructor.

ANTH 359 Linguistic Ethnography (5) I&S Language use in cultural contexts. How language reflects world view. Language use in culturally significant settings. Analyzes sets of culturally specific terms in semantic domains. Includes projects demonstrating application of theory and method to data addressing specific problems. Workshop format.

ANTH 371 Political Anthropology (3) I&S Theories of the development of political forms and of the social structural analysis of political organization. Authority, power, and concepts of politics and administration.

ANTH 372 Anthropology of Law (3) I&S Major theories and studies in legal anthropology. Dispute settlement, juridical processes, and concepts of law and legal activities.

ANTH 373 Stateless Societies: An Ethnographic Approach to Noncentralized Political Systems (5) I&S Comparative examination of modes of governance in noncentralized societies. Forms of decision making, competition for supports, resolution of conflicts, and boundary maintenance with adjacent groups. Cases discussed in the context of alternative theories of the development of politics. Prerequisites: POL S 273.

ANTH 375 Comparative Systems of Healing (3) I&S Introduction to the anthropological study of healing. Examines four healing traditions and addresses their similarities and differences. Includes anthropological theories of healing and religion.

ANTH 399 Junior Honors Seminar (5) I&S Teaches skills required to write senior honors thesis, including evaluation of academic and scientific writing, formulation of problem, collection of bibliographic and other resources, evaluation of research proposals, and research proposal preparation. Final product is a formal thesis prospectus. Prerequisite: junior or senior standing in departmental honors program.

ANTH 401: West African Societies (3) I&S Social and cultural features of coastal and interior West African societies, including the Western Sudan. Detailed study of selected societies. Prerequisite: one 200-level ANTH course or permission of instructor.

ANTH 402 Societies of Eastern and Southern Africa (5) I&S Historical background and contemporary life of cultural groups in eastern and southern Africa with special study of selected cases of political and economic organization and cultural change. Prerequisite: one 200-level ANTH course or permission of instructor.

ANTH 404 South America (5) I&S Survey of anthropological research among the traditional peoples of South America. Historical background and contemporary life of cultural groups of the Amazonian Basin. Transformation of traditional life-styles through the process of European conquest and the aftermath of colonialism. Detailed study of selected societies. Prerequisite: 100.

ANTH 405 Peoples of Russia (5) I&S Traditional cultural and social organizations of the various nationalities in Russia. Particular emphasis on peoples of Siberia. Role of traditional culture in shaping contemporary lifestyles in a multiethnic, diversified setting. Prerequisite: one 200-level ANTH course or permission of instructor. Offered: jointly with SISRE 405.

ANTH 408 New Guinea Societies (5) I&S Peoples and cultures of coastal and interior New Guinea and adjacent islands. Deals intensively with selected general problems of ethnographic method and ethnological and sociological interpretation. Character of small autonomous societies in Melanesia: ecology, economics, gender, systems of exchange, social organization, magic and ritual, warfare. Prerequisite: one 200-level ANTH course or permission of instructor.

ANTH 408 Micronesian Societies (3) I&S Comparative social anthropology of the social systems of high islands and coral atolls of Micronesia. Intensive treatment of the kinship, religion, ecology, and politics in both traditional and contemporary periods. Prerequisites: either 216 or permission of instructor.

ANTH 412 South Asian Social Structure (5) I&S Caste dynamics, political control, economic organization, and religion in Hindu-village India. Prerequisite: one 200-level ANTH course or permission of instructor.

ANTH 415 Applied Ethnography (3) I&S Examines the social context of applied cultural anthropology and prepares students for nontraditional uses of anthropological theory, knowledge, and training. Rationale for applied ethnographic research, professional training, the research proposal/contract, social change, applied anthropology, the research product.

ANTH 418 Indian Heritage of Mexico and Central America (5) I&S Indian civilization of Mexico and Guatemala, their origins and ecological foundations. Contemporary communities of Mexico and Guatemala, focusing on creative adaptation of pre-Columbian traditions to modern national realities. Prerequisite: one 200-level ANTH course or permission of instructor.

ANTH 419 Islamic Peoples of Southwest and South Asia (5) I&S Analysis of ethnographic issues in the study of Islamic peoples of India, Pakistan, Afghanistan and Iran, with attention as appropriate to contiguous areas of the Middle East. Topics include ethnic diversity, family patterns, gender, folk expressions of Islam, and recent social change. Prerequisite: one 200-level ANTH course or permission of instructor.

ANTH 420 Psychoanalysis and the Study of Culture (3) I&S *Spain* Anthropological use of theories developed by Freud to understand culture. Reviews psychoanalytic theory as a foundation for examining the work of Roheim, LaBarre, Devereaux, Kardiner, and Spiro, among others. Topics covered include the universality of oedipality and the utility of psychoanalysis in non-Western cultures.

ANTH 421 Belief, Ritual, and the Structure of Religion (5) I&S Systematic survey of concepts, models, and theories that characterize the anthropological study of religion. Consideration of the human universal

basis of religion and of diverse ways in which religions are constructed and related to social experience. Prerequisites: 321 or RELIG 201 and 202.

ANTH 424 Hunter-Gatherer Societies (4) I&S Comparative examination of human foraging societies, emphasizing ethnographic cases and socioecological analysis. Foraging and human evolution; rationality of foraging societies; population and reproductive strategies; variability in social organization and land use; power relations between the sexes; ritual and belief; contemporary status of hunter-gatherer populations. Prerequisite: one 200-level ANTH course or permission of instructor.

ANTH 425 Ethnicity and Nationality in the USSR and its Successor States (5) I&S Creation of the Soviet Union: Leninist and Stalinist approaches to the "national question." Contemporary processes of ethnic assimilation and dissimulation. Formation of national elites, rise of various forms of nationalism, position of religion in national cultures. Specific cases include Russian nationalism, Islam in Central Asia. Offered: jointly with SISRE 425.

ANTH 426 Peasant Culture and Society (5) I&S Place of peasants in state, civilization, and global economy, especially as seen from peasants' perspective. Consideration of cases drawn from anthropological studies. Prerequisite: one 200-level ANTH course or permission of instructor.

ANTH 427 Anthropology in Urban Settings (3) I&S Cross-cultural examination of theoretical issues in anthropology as studied in urban places. Focuses on ethnic identity and the formation of urban ethnic groups; migration and its rural and urban consequences; family and kinship organization as an adaptation to urban complexity; the nature of urban voluntary associations; law and politics; and the developments in anthropological method. Prerequisite: one 200-level ANTH course or permission of instructor.

ANTH 428 Anthropological Perspectives on Ethnicity (5) I&S Anthropological approaches to ethnicity and ethnic group relations with reference to other models including race, caste, class, regional groupings, nations, religion, and stratification. Data drawn from precolonial, colonial, and postcolonial periods. Prerequisite: one 200-level ANTH course or permission of instructor.

ANTH 429 Expressive Culture (5) VLPA Anthropological view of one expressive aspect of culture: plastic and graphic arts, myth and folklore, music, dance, humor and tragedy, or play and games. Prerequisite: one 200-level ANTH course or permission of instructor.

ANTH 430 The Anthropology of Music (3) VLPA/I&S Analysis of aspects of anthropological thought influential in ethnomusicology. Critical evaluation of dominant theoretical schools and modes of explanation, e.g., evolutionist, diffusionist, historical particularist, structuralist, functionalist, symbolist, and semiotic, through detailed examination of seminal texts. Offered: jointly with MUSIC 480; alternate years.

ANTH 431 Oral Traditions (5) VLPA Oral traditions and verbal expression, examined anthropologically and in relation to student interests. Critical examination of relevant theories and methods of analysis. Prerequisite: 100.

ANTH 432 Sociolinguistics (3) VLPA/I&S Social variation in phonology, morphology, syntax, lexicon of languages and dialects. Nonstandard language, diglossia, pidgins and creoles, gender differences, bi- and multilingualism, the ethnography of speaking, pragmatics, and language attitudes. Prerequisite: LING 400. Recommended: concurrent registration in LING 451 or permission of instructor. Offered: jointly with LING 432.

ANTH 434 Comparative Morals and Value Systems (3) I&S Moral basis of human society and com-

parison of value systems based on anthropological studies. Prerequisite: one 200-level ANTH course or permission of instructor.

ANTH 435 Economic Anthropology (5) I&S Chief features of nonmonetary and simple monetary economics. Impact of central or metropolitan market economy and industrial technology as peripheral systems, especially of small-scale and limited monetary circulation. Development and application in anthropology of economic concepts, including Marxian. Prerequisites: permission of instructor.

ANTH 436 Comparative Family Organization (5) I&S Function and structure of family developmental processes in band, tribal, peasant, and modern societies. Illustrates inter- and intrasocietal variation and provides data for construction of formal models of process and variation in family systems.

ANTH 437 Political Anthropology and Social Change (5) I&S Anthropological studies of local-level politics in colonial, modernizing, and encapsulated societies. Processual approaches to the study of political change. Prerequisites: 371 or permission of instructor.

ANTH 438 The Analysis of Kinship Systems (5) I&S Data, theories, and analytical technique used in the study of kinship systems, including our own, from around the world. Prerequisite: one 200-level ANTH course or permission of instructor.

ANTH 439 Law in Changing Societies (5) I&S Anthropological viewpoints on legal aspects of colonial, modernizing, and encapsulated societies. Problems of plural legal systems and of conflicts in judicial systems. Prerequisites: 372 or permission of instructor.

ANTH 440 Child-Rearing, Culture, and Health (3) I&S Cross-cultural study of the child-rearing practices, cultural norms, and health behavior of children and adolescents in different societies. Comparative approaches, diverse theoretical postures, and empirical research findings are used. Recommended: courses in child development or introductory anthropology. Offered: jointly with NURS 495.

ANTH 441 Psychological Anthropology (5) I&S Assessment of mutual relevance of cultural and psychological variables in anthropology. Historical development of principal topics, e.g., cognition, national character, enculturation, personality and social change, cross-cultural psychiatry, sex and temperament, deviance, and psychoanalytic studies of culture. Prerequisite: introductory psychology or personality theory or permission of instructor.

ANTH 442 Anthropological Aspects of Communication (5) I&S Introduction to communicational aspects of culture.

ANTH 443 Anthropology of Modern Japan (5) I&S Examines the problem of modernity in Japan since the late nineteenth century, with emphasis on contemporary Japan. Critically addresses previous anthropological work concerning patterns of Japanese "culture". Particular focus on the influence of modern forms of power, media, and exchange in the construction of present-day Japan. Offered: jointly with SISEA 447.

ANTH 447 Religion in China (5) I&S Place of religion in Chinese society, examining the doctrines, practices, and social consequences of the eclectic folk religion, the elite Confucian, Taoist, and Buddhist traditions, syncretistic sects, and imported Christianity. Prerequisite: one course in Chinese society, politics, or history or permission of instructor. Offered: jointly with SISEA 445.

ANTH 448 Modern Korean Society (5) I&S Social organization and values of twentieth-century Korea. Changes in family and kinship, gender relations, rural society, urban life, education, and industrial organization since 1900. Differences between North and South

Korea since 1945. Prerequisites: SISEA 212 or permission of instructor. Offered: jointly with SISEA 448.

ANTH 449 Social Transformation of Modern East Asia (5) I&S Comparative study of social change in China, Japan, Korea, and Vietnam since 1945. Concentration on small-scale social units in rural and urban areas under both communist and capitalist political systems. Prerequisites: two courses on East Asian history or society. Offered: jointly with SIS 449.

ANTH 451, 452, 453 Phonology I, II, III (4, 4, 4) VLP&I&S Speech sounds, mechanism of their production, and structuring of sounds in languages; generative view of phonology. Prerequisite: LING 200 or 400, either of which may be taken concurrently with 451. Offered: jointly with LING 451, 452, 453.

ANTH 454 Women, Words, Music, and Change (5) VLP&I&S Comparative analysis of use of myths, tales, music, and other forms of expressive culture to account for, reinforce, and change women's status and roles; cross-cultural analysis of planned change and development. Prerequisite: 353 or permission of instructor. Offered: jointly with WOMEN 454.

ANTH 455 Areal Linguistics (3, max. 6) VLP&I&S Issues involved in classification of languages. Systems of classification based on structure, word order, areal features. Ways in which languages may be classified for different purposes. Borrowing vocabulary specialization, lexical change, and language death and revival. Offered: jointly with LING 455.

ANTH 456 Contemporary Ethnography (5) I&S Techniques and theories of ethnographic description for the anthropological analysis of contemporary life. Materials drawn from the contemporary United States, with a focus on issues and events in the Seattle area. Includes fieldwork projects. Prerequisite: permission of instructor.

ANTH 457 Ecological Anthropology (5) I&S Survey of anthropological research on interaction between human societies and their environments. Logic of different subsistence systems; intensification and transformation of subsistence strategies; population regulation; ecological aspects of human nutrition, disease, spatial organization, ethnicity, social stratification, conflict, and cooperation; historical roots of current ecological crisis. Prerequisite: permission of instructor.

ANTH 458 Ethnobiology: Plants, Animals, and People (5) I&S *Hunn* Culturally mediated relationships between human and natural environment studied in a comparative and evolutionary framework. How do peoples in diverse cultures recognize and name plants and animals and understand their relationship with nature? How is this traditional ecological knowledge applied in people's daily lives? Prerequisite: 203, BIO A 201, or ARCHY 205. Offered: Sp.

ANTH 460 History of Anthropology (5) I&S Sources and development of leading concepts, issues, and approaches in anthropology. Findings of anthropology in relation to scientific and humanistic implications and to practical application. Main contributors to field; their work and influence. Past, present, and future perspectives, including anthropology of modern life. Prerequisites: 15 credits in anthropology.

ANTH 461, 462, 463 Syntax I, II, III (4, 4, 4) VLP&I&S Study of the structural properties of language; introduction to generative transformational syntax. Prerequisite: LING 200 or 400, which may be taken concurrently, or permission of instructor. Offered: jointly with LING 461, 462, 463.

ANTH 464 Language Policy and Cultural Identity (3) VLP&I&S Decision making regarding language in sociopolitical contexts. Language and ethnicity, educational policy, and use of language in developing nations. Plans to modernize, purify, standardize, reform, and revive language. Language loyalty and mo-

tives for second-language acquisition. Prerequisite: LING 200 or 400. Offered: jointly with LING 433.

ANTH 465 Critical Anthropology of Mass Culture (5) I&S *Ivy* Critical overview of theories of mass culture and their relationship to current anthropological practice. Analyses of the historical interconnections among capitalism and commodity fetishism, modernity and representation, and media and consumption. Prerequisite: upper-division standing or permission of instructor.

ANTH 466- Anthropology Honors Thesis (1-9), max. 18) I&S Individual research under the direction of a thesis advisor, culminating in a senior honors thesis. Open only to upper-class students in departmental honors program.

ANTH 469 Special Studies in Anthropology (3-5, max. 15) I&S Delineation and analysis of a specific problem or related problems in anthropology. Offered occasionally by visitors or resident faculty. Prerequisite: one 200-level ANTH course or permission of instructor.

ANTH 470 Minority Peoples of China (5) I&S Interaction between China and the peoples of its periphery, including inner Asia, Tibet, northern mainland Southeast Asia, and aboriginal peoples of Taiwan. Emphasis on ethnicity, ethnic group consciousness, and role of the Chinese state. Prerequisites: one 200-level ANTH course or HSTAS 454 or ANTH 370. Offered: jointly with SISEA 470.

ANTH 471 Colonialism and Culture (5) I&S *Pemberton* Explores the cultural, political, and historical implications of the power to colonize. Readings include ethnographic, historical, and literary works on colonialism, nationalist responses, and postcolonial positions.

ANTH 475 Perspectives in Medical Anthropology (5) I&S Introduction to medical anthropology. Explores the relationships among culture, society, and medicine. Examples from Western medicine as well as from other medical systems, incorporating both interpretive and critical approaches. Offered: jointly with HSERV 475.

ANTH 476 Culture, Medicine, and the Body (5) I&S Explores the relationship between the body and society, with emphasis on the role of medicine as a mediator between them. Case study material, primarily from contemporary bio-medicine, as well as critical, postmodern, and feminist approaches to the body introduced within a general comparative and anthropological framework.

ANTH 480 Introduction to Museology (3) I&S Museum history, philosophy, and basic operations, including organization, income, collection management, conservation, exhibition, security, education, research, and ethics. Prerequisite: upper-division standing or permission of instructor. Offered: jointly with MUSEUM 480.

ANTH 481 Museum Collection Management: Ethnology (3) I&S Lecture and work experience in museum collection management in the ethnology collections of the Burke Memorial Washington State Museum, including identification, cataloging, fumigation, storage, cleaning, inventory, and specimen preparation for exhibition of archival and nonarchival museum specimens from North America, the Pacific, and Pacific Rim areas. Prerequisite: 480 or permission of instructor. Offered: jointly with MUSEUM 481.

ANTH 482 Museum Conservation (3) I&S Lecture and demonstrations in the recognition and treatment of museum conservation problems for specimens of all types. Application of basic principles to specific preventive and active conservation and restoration problems encountered by curatorial personnel. Prerequisites: 480 and 481 or permission of instructor. Offered: jointly with MUSEUM 482.

ANTH 483 Women in Evolutionary Perspective (5) I&S/NW Critical appraisal of major theories accounting for evolution of sex and gender roles and status differences; cross-cultural testing for sociobiological, biocultural, cultural materialist, structural, and symbolic explanations for "female power and male dominance." Prerequisite: 353 or permission of instructor.

ANTH 484 Ideologies and Technologies of Motherhood (5) I&S Examines how motherhood is culturally constituted, regulated, and managed within various ideological and technological milieus. Uses ethnographies from anthropology and case studies from feminist legal theory. Topics include slave mothers, surrogate mothers, lesbian mothers, transracial mothers, co-mothers, and teen mothers. Prerequisites: WOMEN 200 and any 300-level women studies course. Offered: jointly with WOMEN 458.

ANTH 486 Human Family Systems: Biological and Social Aspects (5) I&S Biological bases for human mating and reproduction and an examination of the range of cross-cultural variability in human systems of kinship and marriage; comparisons among a wide range of human and nonhuman species and between Western and non-Western human societies; interplay of biological, ecological, and sociocultural factors in determining the structure and function of human family systems. Prerequisite: 100 or BIO A 201 or SOC 110. Offered: jointly with SOC 486.

ANTH 489 Anthropology Practicum (3-9, max. 15) Faculty-supervised off-campus internships in organizations utilizing anthropological skills in nonacademic settings. Establishing educationally valuable individual projects for internships with faculty sponsor. Organizations include museums, social service and other governmental agencies, and private nonprofit service agencies. Prerequisites: major in anthropology and permission of instructor.

ANTH 491 Honors Colloquium (2, max. 12) I&S Introduction to anthropological research. Students read original articles and papers and discuss them with authors. Research presenters include department faculty, visiting faculty, and advanced graduate students. Credit/no credit only. Prerequisite: students in the departmental honors program, or other social science or biological science honors programs. Offered: AWSp.

ANTH 492 Anthropology of Refugees (3) I&S The refugee phenomenon, its emergence in the postcolonial world, and the structure of the life history of refugees. Ethnic change, involuntary deculturation, and acculturation as they occur in refugee life histories. Prerequisite: one 200-level ANTH course or permission of instructor. Offered: jointly with NURS 492.

ANTH 493 Advanced Topics in Expressive Culture (3, max. 6) VLP Analysis and testing of special domains of esthetic expression, such as graphic arts, oral literature, dance, and humor among non-Western peoples. Prerequisites: 429 or permission of instructor.

ANTH 495 Advanced Problems in Ethnology (3, max. 6) I&S Current problems in ethnology. Seminar format. Prerequisites: 25 credits in anthropology and permission of instructor.

ANTH 499 Undergraduate Research (* max. 12) Prerequisite: permission of instructor.

Archaeology

ARCHY 105 World Prehistory (5) I&S Prehistoric human ancestors from three million years ago: their spread from Africa and Asia into the Americas, survival during ice ages, development of civilizations. Well-known archaeological finds, e.g., Olduvai Gorge; Neanderthals; Jericho; Egyptian pyramids; Mexican temples; Mesa Verde; Ozeite, Washington. May not be counted toward the 55 credits required for the major in anthropology.

ARCHY 205 Principles of Archaeology (5) I&S Techniques, methods, and goals of archaeological

research. Excavation and dating of archaeological materials. General problems encountered in explaining archaeological phenomena. Offered: AWSpS.

ARCHY 270 Field Course in Archaeology (12) I&S Introduction to field acquisition of archaeological data through survey and excavation. On-going field projects; recovery and recording techniques. Prerequisite: permission of department. Offered: S.

ARCHY 299 Archaeological Laboratory Techniques (1-3, max. 12) I&S Laboratory procedures geared to one specific archaeological research project. Archaeological collection, its processing and curation, how archaeological materials are processed, and how significance is determined. No more than 5 credits may be used toward an Anthropology Major. Prerequisite: 105 or 205.

ARCHY 303 Old World Prehistory (3) I&S Old World prehistory from beginnings of human culture to rise of civilizations. First tools made by humans, spread of humans out of Africa, origins of agriculture, rise of state society. Africa, Near East, Egypt, China, India, Europe.

ARCHY 304 New World Archaeology (3) I&S History of earliest Americans, beginning with crossing of land bridge between Asia and North America and eventual spread over the Americas. Highlights prehistory and best examples of western hemisphere's civilizations. Mexico, Yucatan, Peru, southwestern and eastern United States, Washington.

ARCHY 312 The Archaeology of Egypt (3) I&S Wenke A survey of ancient Egyptian culture history between about 6000 BC and AD 400, based on a synthesis of archaeological and textual evidence. Focuses on the origins and evolution of the Egyptian state and the elements of pharaonic religion, society, economy, art, architecture, and science.

ARCHY 320 Prehistory of the Northwest Coast (5) I&S Origin, development, and variation of Pacific Northwest cultures from early migrations to nineteenth century. Adaptation to maritime and interior environments; artifacts and art.

ARCHY 371 Analysis of Archaeological Data (5) I&S Analyzing archaeological data by measuring and describing such artifacts as stone tools and ceramics. Analysis of such environmental data as bones, plant remains, and sediments. Prerequisite: 205 or permission of instructor.

ARCHY 465 Issues in Cultural Resource Management (3) I&S Examines practical application of archaeology to cultural resource management. Topics include role in environmental permitting, inventory and significance evaluation of resources, project impacts and design of mitigation measures, consultation with government agencies and Indian tribal organizations, and practical aspects of cultural resource management business operation. Offered: even years; Sp.

ARCHY 466- Archaeology Honors Thesis ([1-6], max. 18) I&S Individual research under the direction of a thesis advisor, culminating in a senior honors thesis. Open only to upper-class students in departmental honors program.

ARCHY 468 Issues in Cultural Resource Management (1) I&S Review of federal and state cultural resource management policies and the effects of these policies on the conduct of projects that may impact cultural resources on public lands. Survey of related issues in museum management. Prerequisites: 205 and ANTH 202 or permission of instructor. Credit/no credit only.

ARCHY 469 Special Studies in Archaeology (3-6, max. 18) I&S Consideration in detail of specific archaeological topics, either methodological or substantive in content, of current interest. Offered occasionally by resident, new, or visiting faculty. For advanced undergraduates and graduate students. Prerequisites: 205 and permission of instructor.

ARCHY 475 Maya Prehistory (3) I&S Considers prehistoric cultural developments throughout the Central American region occupied by the prehistoric Maya. Temporal focus spans the late Preclassic, Classic, and Postclassic periods, from 300 BC to 1530 AD. Contrasts traditional and contemporary models of ancient Maya civilization. Prerequisites: 205, 304, or permission of instructor.

ARCHY 476 New World States and Empires (3) I&S Hagstrum Considers theoretical and methodological scholarship on complex societies in Mesoamerica and the Andes. Highlights current research emphasizing roles of populations dynamics, subsistence strategies, economic foundations, and political processes in development of states and empires. Considers archaeological evidence and native and European documents. Prerequisites: 205 and 304 or permission of instructor.

ARCHY 478 Prehistoric Cultures of North America: Western North America (5) I&S Ecological account of prehistoric cultural developments in North America west of the Rocky Mountains. Cultural and environmental change from appearance of people in New World to collapse of indigenous cultural systems. Prerequisite: 304 or permission of instructor.

ARCHY 479 Prehistoric Cultures of North America: Eastern North America (5) I&S Ecological and evolutionary account of prehistoric cultural developments in North America east of the Rocky Mountains. Cultural and environmental change from appearance of people in New World to collapse of indigenous cultural systems. Prerequisite: 304 or permission of instructor.

ARCHY 480 Advanced Archaeological Analysis: Tools (6) I&S Combination of lecture and practical laboratory instruction in the presentation of archaeological data for analysis, emphasizing stylistic and functional analyses of lithic, ceramic, and other artifacts, attribute recognition, and standard techniques for data manipulation. Theoretical bases for techniques and their uses and limitations in cultural, historical, and processual accounts. Prerequisite: 371 or permission of instructor.

ARCHY 481 Advanced Archaeological Analysis: Faunal Remains (6) I&S Seminar on techniques and methods employed in analysis of faunal remains from a wide range of Pleistocene and Holocene settings, including archaeological sites, coupled with a laboratory focusing on identification of faunal remains from these settings. Prerequisite: 371 or permission of instructor.

ARCHY 482 Advanced Archaeological Analysis: Geoarchaeology (6) I&S Identification, analysis, and interpretation of sediments and soils associated with archaeological remains. Laboratories deal with sediment description and chemical analysis; field trips and student projects focus on archaeological applications of these subjects. Prerequisite: 371 or permission of instructor.

ARCHY 495 Quantitative Archaeological Analytic Techniques (5) I&S Introduction to quantitative approaches to archaeological problems; data screening, numeric methods of classification and identification, graphical and computer-based seriation techniques, and the analysis of spatial patterning in artifact distributions.

ARCHY 497 Archaeological Method and Theory I: Formal Theory (5) I&S Examination of theoretical constructs in the analysis of archaeological data. Terminology, typologies, and interregional comparisons. Prerequisites: 205 and 20 additional credits in anthropology and permission of instructor.

ARCHY 498 Archaeological Method and Theory II: Explanatory Theory (5) I&S Conceptual frameworks employed by archaeologists in obtaining explanation in the three major areas of culture history, cultural reconstruction, and explanatory prehistory, considering the nature of explanation as conceived in these areas, the basic assumptions employed in achieving

these aims, and an introduction to the methods employed. Prerequisites: 205, 497.

ARCHY 499 Undergraduate Research (* max. 12) Prerequisite: permission of instructor.

Biocultural Anthropology

BIO A 100 Evolution and Human Behavior (3) NW Introduction to evolution by natural selection, examining the light it can throw on human biology and behavior in such areas as the nature of sex differences, sexual conflict, and conflict between parents and children. Does not fulfill major requirements. Offered: jointly with ZOOL 100.

BIO A 201 Principles of Biological Anthropology (5) NW Evolution and adaptation of the human species. Evidence from fossil record and living populations of monkeys, apes, and humans. Interrelationships between human physical and cultural variation and environment; role of natural selection in shaping our evolutionary past, present, and future. Offered: AWWSpS.

BIO A 370 Introduction to Primates (5) NW Origins, major evolutionary trends, and modern taxonomic relationships of the nonhuman primates. Their distribution and habitat in relation to behavioral and morphological adaptations and their status as endangered species. Prerequisite: 201.

BIO A 371 Evolutionary Perspectives on the Human Condition (4) I&S/NW The human species—past, present, and future. Biological uniqueness of the human species; its role in biological and cultural extinctions. Conceptions and misconceptions of species behavior. Evidence for ongoing human evolution evaluated in relation to present population redistribution and reorganization.

BIO A 372 Uses and Abuses of Evolutionary Views of Human Behavior (5) I&S/NW Newell Interaction of human behavior and biology as it has been interpreted within an evolutionary framework. Discusses various challenges to Darwinian theory, particularly Lamarckism and creationism. Topics include biological determinism as exemplified by racism, myths of human origins, the clash between biological and cultural determinism, and modern genetics and behavior.

BIO A 375 Biology of Human Race (3) NW World-wide distribution of variation in human biology: shape, size, skin color, body composition, human performance. Natural selection, historical factors, random biological events. History of attempts to classify people into racial groups and problems associated with such efforts. Prerequisite: 201 or permission of instructor.

BIO A 382 Human Population Biology (3) NW Human population biology with reference to capacity for growth in population size. Interaction of human biology, population structure, and culture in promoting such growth. Effects of economic, demographic, medical, and ecological factors.

BIO A 387 Ecological Perspectives on Environmental Stress, Adaptation, and Health (5) NW Leonetti How human populations respond to environmental stressors in biological-behavioral terms and the relationship of this adaptational process to health. Nutritional, climatic, and sociocultural stress and associated patterns of birth, disease, and death throughout human history in hunting, gathering, farming, pre-industrial, and industrial societies. Prerequisite: 201 or permission of instructor.

BIO A 388-389 Human Fossils and Evolution (5-5) NW Evolution of human anatomy and behavior as adaptations to changing environments. Human fossils: their geological context, age, ecological setting used to reconstruct the evolution of our species during the last six million years of earth history. Prerequisite: 201 or BIOL 201, 202, 203.

BIO A 466- Biocultural Anthropology Honors Thesis (1-8), max. 18) NW Individual research under the direction of a thesis advisor, culminating in a senior honors thesis. Open only to upper-class students in departmental honors program.

BIO A 469 Special Topics in Biocultural Anthropology (3, max. 6) NW Delineation and analysis of a specific problem or a more general area in biocultural anthropology. Offered occasionally by visitors or resident faculty. Prerequisite: permission of instructor.

BIO A 473 Biological Adaptability of Human Populations (5) NW Mechanisms enabling humans to maintain homeostasis in extreme environments: high altitude, heat, cold, nutritional deficiency, radiation. Adaptive process operating at levels of physiology, metabolism, and population, including the strategies of fertility and birth spacing. Prerequisites: 201 and physiology or permission of instructor.

BIO A 476 Sociocultural Ecology and Health (3) NW Sociocultural ecology of health/disease, focusing on humans as bioculturally integrated beings and on populations as biocultural units of adaptation. Examples of research on disease, both infectious and chronic, and patterns of morbidity and mortality, infant, maternal, old age, with particular attention to situations of sociocultural changes.

BIO A 482 Human Population Genetics (5) NW, QSR Micro-evolutionary changes in human populations. Effects of mutation, selection, inbreeding, gene flow, and genetic drift as causes of evolutionary change. Mathematics beyond high school not required. Prerequisite: 201 or permission of instructor.

BIO A 483 Human Genetics, Disease, and Culture (5) NW Considers relationships among genetic aspects of human disease, cultural behavior, and natural habitat for a wide variety of conditions. Also considers issues of biological versus environmental determinism, adaptive aspects of genetic disease, and the role of cultural selection. Prerequisite: 201 and a general background in biology.

BIO A 484 Human Life Cycle (5) NW Human growth and physical/social development: fetal life to old age. Cultural, ecological, and evolutionary aspects of the life cycle. Population differences in age and sex related to morbidity and mortality. Prerequisite: 201 or permission of instructor.

BIO A 485 Research in Growth and Development (2, max. 8) NW Discussion and research on topics relating to primate growth and development, using either published materials or data from on-going studies at this university. Prerequisites: 484 which may be taken concurrently and permission of instructor.

BIO A 488 Primate Socioecology (3) NW Focus on the variety of social systems exhibited by nonhuman primates and adaptive significance of these societies; social systems in terms of the present ecology and evolutionary past of the species; the function of communicatory gestures and vocalizations, tradition, kinship, and social roles in maintaining and structuring groups over generations; the relationship among mating systems, foraging strategies, ranging patterns, and ecological separation/resource partitioning and their contribution to species-typical social organization. Prerequisite: 201.

BIO A 487 Human and Comparative Osteology (3) NW Introduction to the vertebrate skeleton. The skeleton is described in detail and various methods of determining age and sex, as well as osteometry and modern statistical methods for handling such data, are presented. Prerequisite: permission of instructor.

BIO A 489 Early Evolution of the Hominidae (5) NW Data and interpretations basic to the Pliocene and early Pleistocene evolution of the family Hominidae. Presentation of the geological contexts, ages, faunal associations, and fossil and cultural remains of the hominid lineages. Practical experience

with the hominid fossil material and explanation of the morphological and contextual similarities and differences. Prerequisite: 201 or permission of instructor.

BIO A 490 Later Evolution of the Hominidae (3) NW Data and interpretations basic to the middle and late Pleistocene evolution of the family Hominidae. Presentation of the geological contexts, ages, faunal associations, fossil and cultural remains of the hominid images. Practical experience with the hominid fossil material and explanation of the morphological and contextual similarities and differences. Prerequisite: 201 or permission of instructor.

BIO A 499 Undergraduate Research (* max. 12) Prerequisite: permission of instructor.

Courses for Graduates Only

General

ANTH 600 Independent Study or Research (*)

ANTH 700 Master's Thesis (*) Credit/no credit only.

ANTH 800 Doctoral Dissertation (*) Credit/no credit only.

Sociocultural Anthropology

ANTH 500 Preceptorial Reading (6) For beginning graduate students who have not had adequate training in the problems, principles, and methods involved in the analysis and comparison of social and cultural systems. Not open to graduate students in the sociocultural anthropology program.

ANTH 503 Preceptorial Reading in Linguistic Anthropology (6) For beginning graduate students who have not had prior training in the problems, principles, and methods involved in linguistic anthropology. See also course description for 203. Not open to graduate students in the linguistics program.

ANTH 507-508 Current Issues in Sociocultural Anthropology (2-2) Biweekly presentations by participants and guest lecturers of current literature and ongoing research in topics pertaining to social, cultural, and linguistic anthropology. Prerequisite: first-year sociocultural graduate students in good standing or permission of sociocultural faculty. Credit/no credit only.

ANTH 509 Sociocultural Anthropology Problem Paper (4) All first year graduate students in sociocultural anthropology select a topic for independent research, conduct that research, and prepare a paper of about 25-50 pages on the topic chosen. Prerequisite: first-year sociocultural graduate students in good standing or permission of sociocultural faculty.

ANTH 510 Seminar on North American Indians (3) Advanced comparative treatment of selected aspects of the Indian cultures and societies of North America.

ANTH 514 Regional Seminar (3, max. 12) Comparative treatment of selected aspects of cultures and societies of a particular region or area.

ANTH 517 Seminar on South Asia (3) Advanced analysis of selected problems in South Asian ethnology and social structure. Prerequisite: 412.

ANTH 520 Ecology, Evolution, and Anthropological Theory (3-5) Critical examination of models and theories from evolutionary ecology, sociobiology, and ecological anthropology. Potential and actual utility of such models in explaining aspects of human social behavior, cultural evolution, and cross-cultural variation in strategies of production and reproduction.

ANTH 521 Seminar on the Anthropological Study of Religion (3, max. 9) Advanced seminar in the anthropological study of religion designed for students who have a background in the theory and applications of theory developed in the anthropological study of religion. Seminar topics vary each quarter. Prerequisite:

sites: 422 and graduate standing; permission of instructor for graduate students in Comparative Religion.

ANTH 522 Seminar on South American Indians (3) Advanced comparative treatment of selected aspects of the Indian cultures and societies of South America.

ANTH 525 Seminar in Culture Processes (3, max. 6) The concept of process and its application to the study of culture.

ANTH 527 Acculturation and Ethnicity (3) Systematic analysis of psychological, social, and cultural implications of the contact of peoples.

ANTH 528 Seminar in Expressive Culture (3) Detailed study of selected topics in expressive culture from an anthropological point of view. Prerequisite: 429 or permission of instructor.

ANTH 530 Dialectology (3) Principles of dialect deviation as related to linguistic structure and usage. Prerequisite: 452 or permission of instructor. Offered: jointly with LING 530.

ANTH 536 Seminar in Visual Anthropology (3) Significance of anthropological cinema and photography placed in historical perspective. Screening of films to determine the role of the anthropologist as filmmaker, as well as the role of the filmmaker as anthropologist.

ANTH 537 Political Anthropology and Law (3, max. 6) Seminar on special topics in politics and law and their interrelationships. Prerequisites: 437, 439, or permission of instructor.

ANTH 538 Politics of Representation (3) *Pemberton* Representations of power and the powers of representation. Critical approaches to representation in colonial and postcolonial worlds. Divine kings, exemplary centers, the New World Order, voting subjects, and the possibilities of transgression.

ANTH 540 Anthropology and the Subject (3) Seminar on recent theories of the "subject" and their importance for current anthropology. Work on the "self" and "person" distinguished from emphasis on the "subject." Analysis of various theories of language, translation, psychoanalysis, ideology, and power for a general reconsideration of the "subject" and anthropology. Prerequisite: graduate standing.

ANTH 541 Seminar in Psychological Aspects of Culture (3, max. 9) Selected problems in the relation of culture and personality types. Prerequisite: 441 or permission of instructor.

ANTH 542 Seminar in Cognitive Anthropology (3) Examines the intellectual history of cognitive anthropology; assesses its major findings in kinship, folk biology, color classification, and decision and planning theory. Replicates key studies, using cognitive anthropological methods. Evaluates influences from linguistics, psychology, and artificial intelligence research. Practical applications and future prospects.

ANTH 550 Field Techniques in Ethnography (5) Techniques of collecting, ordering, and utilizing ethnographic data in the field. Problems of rapport, elicitation, observation, interpretation, and ethics. Credit/no credit only.

ANTH 551 Research Design (3) Principles of research design, including problem delineation and selection of appropriate methods, as applied to current issues in sociocultural anthropology. Prerequisite: permission of instructor.

ANTH 552 Practicum in Ethnographic Research (3) Techniques of data recording, analysis, and writing for the field ethnographer. Not recommended for non-anthropology graduate students. Prerequisites: 550 and 551.

ANTH 553 Analysis of Linguistic Structures (3, max. 6) Syntactic, semantic, or phonological analy-

sis. Languages to be analyzed vary. Prerequisite: permission of instructor. Offered: jointly with LING 553.

ANTH 555 Discourses in Feminist Anthropology Seminar (5) *Jacobs* Exploration of feminist anthropological theories and the works of their critics. Ways of using feminist anthropology in preparation for and conducting fieldwork. Topics include foundations in feminist anthropology, grand theories, variation in feminist theoretical foci within the "four fields," responses to critics. Prerequisite: graduate standing. Offered: jointly with WOMEN 553.

ANTH 558 The Evolution of the Family (3) Biological evolution of species—specific behaviors and forms of sociality linked to human mating, reproduction, and parenting. Cultural evolution of human systems of kinship and marriage as fitness-maximizing adaptations to a wide range of habitats. Prerequisite: upper-division course in evolutionary theory, population genetics, behavioral ecology, primatology, or animal behavior. Offered: jointly with SOC 556.

ANTH 558 Types and Techniques of Transcription (3) Analysis of aims and problems in the written symbolization of structured data. Emphasis on field transcription of human movement, music, and language. Prerequisite: 202 or permission of instructor.

ANTH 559 Seminar in Language and Culture (3, max. 9) Theoretical and methodological problems in language and culture.

ANTH 561 Seminar in Methods and Theories (3, max. 9)

ANTH 562 Clinically Applied Anthropology (3) Anthropology as it relates to interdisciplinary delivery of health care. Cultural variation in illness beliefs and behavior, types of healing practice, illness prevention, and social support networks. Prerequisites: graduate standing and permission of instructor. Offered: jointly with CHCS 562.

ANTH 565, 566, 567 Theory of Sociocultural Anthropology (6, 5, 5) Core course sequence for the beginning graduate student in sociocultural anthropology in which the development of theory is analyzed and emphasis is placed on the relation between theory and a growing body of ethnographic data. Prerequisites: graduate standing in anthropology or permission of instructor for 565; 565 for 566; 566 for 567.

ANTH 571 Communicational Anthropology (3-9) Introduction to communicational aspects of culture. Prerequisite: permission of instructor.

ANTH 575 Cultural Construction of Illness: Seminar in Medical Anthropology (5) Historical and comparative examination of depression, neurasthenia, somatization, hypochondriasis, and hysteria. Anthropology of psychosomatics and psychiatry, including cultural analysis of selected biomedical, indigenous folk medical, and popular common-sense conceptualizations of illness.

ANTH 584 Ways of Speaking (5) Theory and literature of the ethnography of communication, with special emphasis on the descriptive-comparative approach to culturally patterned styles of communicative conduct. Offered: jointly with SP CMU 584.

ANTH 590 Seminar in Museum Theory (3) Fundamental theoretical issues involved in current museum administrative and operations work, including administrative structure, organizational conflicts, museum-community relations, and museum educational programming. Prerequisite: permission of instructor. Offered: jointly with MUSEUM 590.

ANTH 591 Seminar in Museum Operations (3) Designing hypothetical museums and creating a first year of operations. Design elements include architectural plan, staffing plan, initial and recurring budgets, security system, records system, educational plan, and policy making. Prerequisite: 590 or permission of instructor. Offered: jointly with MUSEUM 591.

ANTH 592 Seminar in Museum Specimen Documentation (3) Seminar discussion of museum specimen documentation research approaches, including technological and raw material analyses, contextual studies, and esthetic studies. Documentation of a collection and reference work. Prerequisites: 590 and 591 or permission of instructor. Offered: jointly with MUSEUM 592.

ANTH 599 Effective Teaching of Anthropology (1) Class required of all graduate students who accept teaching assistantships: instruction in teaching methods and issues, e.g., professional ethics, preparing and delivering lectures, leading discussion groups, test writing and grading, diversity in the classroom. Credit/no credit only.

Archaeology

ARCHY 501 Preceptorial Reading (6) For beginning graduate students who have not had adequate training in the problems, principles, and methods involved in the reconstruction of prehistory. Not open to graduate students in the archaeology program.

ARCHY 520 Principles of Archaeological Theory (5) Review of principles of archaeological theory. Student presentation of research on archaeological theory and seminar discussion or presentations. Open only to first-year graduate students in anthropology.

ARCHY 560 Seminar in Archaeological Methods (5, max. 20) Basis, limitations, and applications of a particular archaeological analytical method, or closely related set of methods. Prerequisite: permission of instructor.

ARCHY 570 Seminar in Archaeological Theory (3, max. 12) Detailed consideration of a particular archaeological theory or closely related set of theories, including their methodological and epistemological bases. Prerequisites: 497, 498.

ARCHY 571 Field Course in Archaeology (5) Introduction to field acquisition of archaeological data through survey and excavation. Ongoing field projects; instructional emphasis on recovery and recording techniques and on management of field projects. Prerequisite: permission of department.

ARCHY 572 Seminar in North American Archaeology (3, max. 6) Selected problems in the archaeology of America north of Mexico. Prerequisite: permission of instructor.

ARCHY 575 Archaeological Field Research Design (6) Nature of the archaeological record, and methods and techniques of field research, to illustrate range of data sources and modern techniques of general applicability. Practical experience in mapping, map interpretation, sampling design, remote sensing, photogrammetry, and research proposal writing. Prerequisite: permission of instructor.

ARCHY 576 Designing Grant Proposals (5) Design and writing of grant proposals for archaeological research at both dissertation and senior investigator levels, with particular emphasis on National Science Foundation structure and requirements. Prerequisites: upper-level graduate standing and permission of instructor.

ARCHY 591 Advanced Field Course in Archaeology (6-9) For students with previous field experience and graduate work in archaeology. Emphasis on decision making in field and project management. Prerequisites: 497, 498, 571, and 575 or permission of instructor.

ARCHY 600 Independent Study or Research (*) Prerequisite: permission of instructor.

ARCHY 601 Internship (3-9) Credit/no credit only.

Biocultural Anthropology

BIO A 502 Preceptorial Reading (6) For beginning graduate students who have not had adequate training

in the study of primate principles and methods involved in the study of evolution, human genetics, and the evolution of modern populations. Not open to graduate students in the biocultural anthropology program.

BIO A 510, 511 Theory and Human Evolution (3, 3) Extensive discussion of evolutionary theory from the views of Darwin through those of contributors to the modern synthesis. Human evolution is stressed, as are controversial aspects of human evolutionary history. Prerequisite: graduate standing or permission of instructor for 510; 510 or permission of instructor for 511.

BIO A 550 Skeletal Biology (5) *Newell* Composition and structure of skeletal tissue. Principles of growth, development, and remodeling applied to the interpretation of microstructure. Various techniques used to analyze bone are covered including histomorphometry and isotope analysis as is their contribution to interpretation of the archaeological record.

BIO A 568 Human Reproductive Ecology (3) A consideration of the determinants of fertility variation within and among traditional human societies. Biocultural and ecological perspectives on pubertal timing, nuptiality, duration of birth intervals, and reproductive senescence. Prerequisite: permission of instructor.

BIO A 569 Demographic Analysis in Biological and Social Anthropology (5) *Leonetti* Demographic analysis relevant to anthropological research on small populations. Use of data collected through local surveys, genealogical methods, and from other sources. Focuses on the use of demography to analyze social and biological processes with adaptive and/or cultural-historical significance. Theoretical approaches to these processes are emphasized.

BIO A 583 Topics in Growth and Development (3, max. 9) Seminar on various topics of human or non-human primate growth and physical/behavioral development. Subject matter varies by quarter. Prerequisite: 484 or permission of instructor.

BIO A 584 Topics in Ecology and Adaptation (3, max. 9) Seminar dealing with various aspects of ecology and adaptation. Topics vary each quarter. Prerequisite: permission of instructor.

BIO A 588 Topics in Primate Evolution (3) Emphasis on fossil taxa and their importance in understanding the morphologies and distributions of members of modern taxa. Prerequisites: 488 and permission of instructor.

BIO A 589 Topics in Hominid Evolution (3) Emphasis on the fossil taxa and their importance in understanding the evolutionary history of the modern genus. Prerequisites: 489 and permission of instructor.

BIO A 590 Current Issues in Human and Non-Human Primate Evolution (2, max. 18) Biweekly presentation by participants and guest lecturers of current literature and ongoing research in topics pertaining to human and nonhuman primate evolution, biology, anatomy, genetics variation, and behavior. Prerequisite: graduate standing in biocultural anthropology or permission of instructor. Credit/no credit only.

BIO A 600 Independent Study or Research (*) Prerequisite: permission of instructor.

students in the University, as well as degree programs for graduate students in applied mathematics.

Minor

Minor Requirements: 30 credits to include AMATH 351, 352, 353, 381, 382, 383, 401, 402, 403. Minimum grade of 2.0 required in each course.

Graduate Program

The Department of Applied Mathematics offers graduate programs of study leading to the degrees of Master of Science and Doctor of Philosophy. These programs involve (1) broad training in those mathematical methods and techniques that have been found useful in applications, (2) in-depth study in at least one field of application, and (3) opportunities to explore various specialized aspects of applied mathematics.

Master of Science, Doctor of Philosophy

Admission Requirements: Prospective students for the Master of Science program should hold an undergraduate degree either in mathematics with a strong background in applications or in physical, engineering, biological, or social science with a strong background in applications-oriented mathematics. Students who wish to apply to the doctoral program need to show evidence of completion of course work equivalent to that described for the master's degree, with at least a 3.40 GPA. In addition, admission to the doctoral program is contingent upon passing a qualifying examination and indication of the ability or potential to perform independent research.

It is required that the Graduate Record Examination be taken and the results sent to Graduate Admissions. Three letters of recommendation are required in support of each application and they should be sent directly to the department. After receiving notification of admission to the Graduate School and a registration appointment, the student should contact the department. (On the Application for Graduate School Admission form, the student should be sure to indicate the desire to enter the Department of *Applied Mathematics*, rather than *Mathematics*.)

Master of Science

The M.S. degree program is designed to provide the student with a working knowledge of several basic areas of applied mathematics, together with exposure to at least one specific area of application. The applied mathematics areas include complex variables, ordinary and partial differential equations, applied linear algebra, numerical analysis, calculus of variations or optimization, and applied probability and statistics. In addition, M.S. students must take the department course offering in mathematical modeling and must acquire some experience in high-speed computation before receiving a degree. The specific area of application is chosen by the student from a broad range of outside fields, including engineering, the physical, biological, and certain areas of medical science. After fulfilling the basic course requirements, the student can obtain the M.S. degree by additional course work to complete the required 40 credits for the degree. Students may elect to do an M.S. thesis in lieu of a maximum of 6 additional course credits. Detailed requirements for the M.S. degree are listed in the applied mathematics graduate program guidelines.

Doctor of Philosophy

The Doctor of Philosophy degree in applied mathematics is primarily a research degree, not conferred as a result of course work alone. The granting of the degree is based on general proficiency and attainment in applied mathematics, together with a demonstrated ability to carry out an independent investigation which is described in a doctoral dissertation. Proficiency and attainment in applied mathematics is demonstrated by

passing the General Examination which tests the student's ability to probe a new area of research and to exercise critical judgment on a technical issue of current importance in the chosen field of research. The doctoral dissertation must exhibit original mathematical contributions in a significant area of application. The Final Examination and defense of the dissertation is a research seminar presentation open to the public. The detailed requirements for the doctoral degree are listed in the applied mathematics graduate program guidelines.

Financial Aid

Both research and teaching assistantships are available to full-time students who qualify. In addition, fellowship funds for the study of applied mathematics are available and awarded on a competitive basis.

Research Facilities

Students in applied mathematics have access to a departmental computing lab equipped with a DEC Alpha server, Alpha/AXP workstations, and X-terminals, with centralized file storage. Software for scientific visualization, numerical analysis, symbolic mathematics, programming, and document preparation is available. The lab is connected to the campus network and the global Internet, providing access to supercomputing facilities and other resources.

Correspondence and Information

Graduate Program Coordinator
408 Guggenheim, Box 352420

Faculty

Chair

Ka Kit Tung

Professors

Baker, Marcia * 1980, (Adjunct); MS, 1960, Stanford University; PhD, 1971, University of Washington; cloud physics, atmospheric geophysics.

Criminale, William O. * 1968; PhD, 1960, Johns Hopkins University; fluid dynamics, mathematical physics, nonlinear mechanics, stability theory.

Ishimaru, Akira * 1953, (Adjunct); PhD, 1958, University of Washington; electromagnetics, optics, acoustics, applied mathematics, scattering theory.

Kevorkian, Jirair * 1964; PhD, 1961, California Institute of Technology; partial differential equations, perturbation theory.

Kosáry, George * 1980, (Adjunct); PhD, 1974, Eotvos Lorand University (Hungary); DSc, 1979, Hungarian Academy of Sciences; applications of stochastic processes in engineering, reacting turbulent flows.

Miura, Robert M. 1988, (Affiliate); PhD, 1966, Princeton University.

Murray, James D. * 1988; PhD, 1956, DSc, 1968, Oxford University (UK); mathematical biology, biological pattern formation, wound healing, spread of epidemics.

Nazareth, John L. 1991, (Affiliate); PhD, 1973, University of California (Berkeley).

O'Malley, Robert E. Jr. * 1990; PhD, 1966, Stanford University; singular perturbations and asymptotic methods.

Pearson, Carl E. * 1967, (Emeritus); PhD, 1949, Brown University; wave propagation, fluid dynamics, numerical analysis, optimization.

Riley, James J. * 1983, (Adjunct); PhD, 1971, Johns Hopkins University; fluid mechanics, especially turbulent flows.

Applied Mathematics

408 Guggenheim

The Department of Applied Mathematics is concerned with mathematical modeling and analysis of problems from the physical, biological, and social sciences and from engineering. The department offers upper-level undergraduate and graduate courses for all interested

Rockafellar, R. T. * 1966; PhD, 1963, Harvard University; variational analysis and optimization.

Tung, Ka Kit * 1988; PhD, 1977, Harvard University; atmospheric and geophysical fluid dynamics.

Vagners, Juris * 1967; PhD, 1967, Stanford University; dynamics, controls and optimization.

Wan, Frederic Y. * 1983, (Affiliate); PhD, 1965, Massachusetts Institute of Technology; solid mechanics and mathematical modeling.

Watkins, David S. 1989, (Affiliate); PhD, 1974, University of Calgary (Canada); linear algebra, numerical computation.

Yeh, Harry H. * 1983, (Adjunct); PhD, 1983, University of California (Berkeley); fluid mechanics, water wave motions, coastal and hydraulic engineering.

Associate Professors

Adams, Loyce M. * 1985; PhD, 1983, University of Virginia; numerical algorithms for parallel computers.

Bretherton, Christopher S. * 1984; PhD, 1984, Massachusetts Institute of Technology; convective cloud systems, mesoscale meteorology, climate theory.

Kot, Mark * 1989; PhD, 1987, University of Arizona; mathematical ecology, nonlinear dynamics, and population biology.

Schmid, Peter J. * 1993; PhD, 1993, Massachusetts Institute of Technology; computational fluid dynamics, hydrodynamic stability theory, transition to turbulence.

Storti, Duane W. * 1983, (Adjunct); PhD, 1983, Cornell University; nonlinear dynamics and vibrations, dynamical systems, perturbations and bifurcations.

Assistant Professors

Lewis, Mark A. 1991, (Affiliate); PhD, 1990, Oxford University (UK).

Pearson, Erik W. 1986, (Affiliate); PhD, 1983, Harvard University.

Winters, Craig B. * 1984, (Affiliate); PhD, 1989, University of Washington.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

AMATH 301 Beginning Scientific Computing (4) Introduction to use of computers to solve scientific and engineering problems. Application of mathematical judgment in selecting tools to solve problems and to communicate results. MATLAB, MATHEMATICA/MAPLE, and NETLIB software used for numerical computation and symbolic manipulation. Prerequisite: MATH 126 or one year of calculus. Offered: AWSp.

AMATH 351 Quantitative Methods I (3) NW Applications of mathematical techniques to problems in the sciences and engineering. Emphasis on formulation, solution, and interpretation of results. Introductory survey of differential equations. Prerequisites: MATH 126. Offered: jointly with MATH/OCEAN 351; A.

AMATH 352 Quantitative Methods II (3) NW Development and application of numerical methods and algorithms to problems in the applied sciences and engineering. Applied linear algebra and introduction to numerical methods. Emphasis on use of conceptual methods in engineering, mathematics, and science. Prerequisites: MATH 126 and any programming language. Offered: jointly with MATH/OCEAN 352; WSp.

AMATH 353 Quantitative Methods III (3) NW Applications of mathematical techniques to problems in the sciences and engineering. Emphasis on formulation, solution, and interpretation of results. Introductory survey of partial differential equations. Examples in

physical and biological sciences and engineering. Prerequisite: 351 or MATH 307. Offered: jointly with MATH/OCEAN 353; WSp.

AMATH 381, 382, 383 Introduction to Mathematical Modeling (3, 3, 3) NW Simple discrete and continuous models of diverse natural and social phenomena with particular reference to the unity of the tools of mathematical analysis useful in their study. 381—discrete methods; 382—a mixture of discrete and continuous methods; 383—continuous methods. Mathematical topics and phenomena. Prerequisites: MATH 126 and 308 for 381; 351 or MATH 307 for 382; 351 and 352 or MATH 324 and 382 for 383. Offered: jointly with MATH 381, 382, 383; A, W, Sp.

AMATH 400 Methods of Engineering Analysis (3) NW Applications of mathematics to problems in chemical engineering; vector calculus; properties and methods of solution of first and second order partial differential equations; similarity transforms, separation of variables, Laplace and Fourier transforms. Prerequisites: MATH 205, MATH 307 or AMATH 351, MATH 324 or permission of instructor. Offered: jointly with CHEM E 400; A.

AMATH 401 Methods in Applied Mathematics I (4) NW Emphasis on acquisition of solution techniques; ideas illustrated with specific example problems arising in science and engineering. Applications of vector differential calculus, complex variables. Line-surface integrals; integral theorems: Taylor and Laurent series, contour integration. Prerequisites: MATH 205; MATH 324 and AMATH 351 or MATH 307 or permission of instructor. Offered: jointly with ENGR 401.

AMATH 402 Methods in Applied Mathematics II (4) NW See 401. Applications of ordinary differential equations; review of elementary concepts for first and second order equations; power series and Frobenius solutions. Laplace transforms; systems of differential equations, eigenvalues. Prerequisites: MATH 205; MATH 324 and AMATH 351 or MATH 307 or permission of instructor. Offered: jointly with ENGR 402.

AMATH 403 Methods in Applied Mathematics III (4) NW See 401. Applications of partial differential equations; linear and quasilinear first order equations, characteristics; classification of linear second order equations; basic solution techniques for parabolic, elliptic, and hyperbolic equations; Green's functions and integral methods. Prerequisite: 402 or permission of instructor. Offered: jointly with ENGR 403.

AMATH 422 Introduction to Mathematical Biology (3) NW Mathematical modeling in biology and medicine. Introduction to chaos and nonlinear dynamics, population models (predator-prey and competition systems), epidemic models with applications to sexually transmitted diseases and dynamic diseases, enzyme kinetics, biological oscillators and switches. Prerequisite 351 or equivalent. Offered: W.

AMATH 423 Mathematical Biology: Spatial Models (3) NW Modeling a variety of spatial problems in the biomedical sciences. Topics chosen from: spatial spread of populations, traveling wave phenomena, pattern formation in biology, spread of cancer tumors, spatial spread and control of epidemics. Prerequisite: 353 or equivalent. Offered: Sp.

AMATH 441 Introduction to Fluid Dynamics (3) Eulerian equations of mass and motion. Surface forces. Vorticity and vortex dynamics. Water waves and interfacial waves; concept of phase and group velocities. Linear instability theory. Simple viscous flows; boundary layer theory. Low Reynolds-number flows, application to biological fluid flows. Prerequisites: 351 and 353.

Courses for Graduates Only

AMATH 500 Special Studies in Applied Mathematics (* max. 12) Lectures and discussions of topics of current interest in applied mathematics. May not be offered every quarter; content may vary from one offering to another. Prerequisite: permission of instructor.

AMATH 501 Seminar in Applied Mathematics (1, max. 6) Special topics and selected problems of current interest in applied mathematics. Credit/no credit only. Offered: AWSp.

AMATH 502 Applied Mathematics Clinic (1-2) The clinic provides consulting service for problems from different academic units requiring assistance in formulation, analysis, and interpretation of mathematical models. Students learn to delineate sources of difficulties, identify or devise a method of solution, and effectively communicate it to clients. Credit/no credit only. Prerequisites: 568, 569, and 584. Offered: AWSp.

AMATH 503 Mathematical Biology I (3) Mathematical modeling in biomedical sciences (mainly ecology, epidemiology, physiology, and zoology). Topics covered include modeling (continuous and discrete), population interactions, dynamic diseases, reaction kinetics, biological oscillators, oscillator generated wave phenomena, epidemics, and the dynamics of infectious diseases. Prerequisites: 402 or equivalent knowledge of ordinary differential equations. Offered: A.

AMATH 504 Mathematical Biology II (3) Mathematical modeling in the biomedical sciences (mainly ecology, epidemiology, and zoology). Topics include spatial spread of populations, traveling wave phenomena in biology, reaction diffusion theory, biological pattern formation mechanisms, mechanochemical theory of morphogenesis, spatial spread of epidemics. (May be taken independently of 503.) Prerequisites: 402, 403 or equivalents; ordinary, partial differential equations. Offered: W.

AMATH 505 Introduction to Fluid Dynamics (4) Eulerian equations for mass-motion; Navier-Stokes equation for viscous fluids, Cartesian tensors, stress-strain relations; Kelvin's theorem, vortex dynamics; potential flows, flows with high-low Reynolds numbers; boundary layers, introduction to singular perturbation techniques; water waves; linear instability theory. Prerequisites: 403 or permission of instructor. Offered: jointly with ATM S 505; A.

AMATH 506 Applied Probability Models (4) Overview of probability models, random variables, independence and conditional probability. Markov chains, stationary time series. Prerequisite: some advanced calculus and linear algebra; familiarity with elementary discrete probability models. Offered: jointly with STAT 506; Sp.

AMATH 507, 508 Calculus of Variations I, II (5, 3) Necessary and sufficient conditions for a weak and strong extremum. Legendre transformation, Hamiltonian systems. Constraints and Lagrange multipliers. Space-time problems with examples from elasticity, electromagnetics, and fluid mechanics. Sturm-Liouville problems. Approximate methods. Prerequisites: 351 or MATH 307; MATH 324, 325 for 507; 507 for 508. Recommended: 402 and 403 or MATH 428 and 429. Offered: jointly with MATH 507, 508.

AMATH 509 Theory of Optimal Control (3) Trajectories obtained from ordinary differential equations with control variables. Controllability, optimality, the maximum principle. Relaxation and the existence of solutions. Techniques of nonsmooth analysis. Prerequisites: real analysis on the level of MATH 426; background in optimization corresponding to 507 or 515. Offered: jointly with MATH 509; even years.

AMATH 510 Applications of Optimization in Engineering Design (3) Discussion of issues arising in applications of optimization to engineering design. Emphasis on formulating problems and selecting appropriate solution techniques. Random search methods for problems otherwise computationally intractable. Individual projects in engineering optimal design. Prerequisites: AMATH/MATH/IND E 515 and MATH 324 or permission of instructor. Offered: jointly with IND E 510.

AMATH 514 Networks and Combinatorial Optimization (3) Networks and directed graphs. Paths and

troes. Feasible and optimal flows and potentials. Transportation problems, matching and assignment problems. Algorithms and applications. Prerequisites: MATH 308 and 324 or equivalents. Offered: jointly with MATH 514.

AMATH 515 Fundamentals of Optimization (5) Maximization and minimization of functions of finitely many variables subject to constraints. Basic problem types and examples of applications; linear, convex, smooth, and nonsmooth programming. Optimality conditions. Saddlepoints and dual problems. Penalties, decomposition. Overview of computational approaches. Prerequisites: MATH 309, 324, or equivalents. Offered: jointly with IND E 515/MATH 515.

AMATH 516 Numerical Optimization (3) Methods of solving optimization problems in finitely many variables, with or without constraints. Steepest descent, quasi-Newton methods. Quadratic programming and complementarity. Exact penalty methods, multiplier methods. Sequential quadratic programming. Cutting planes and nonsmooth optimization. Prerequisite: 515. Offered: jointly with MATH 516.

AMATH 517 Optimization Under Uncertainty (3) Sequential optimization problems involving random variables. Dynamic programming, stochastic programming. Control of uncertain dynamic systems in finite, discrete time. Risk, feedback, adaptivity. Problems with imperfect state information. Applications to optimal stopping, inventory control, resource management. Prerequisites: 506 (or an introduction to basic concepts of probability such as STAT 390 or 394, 395), MATH 308 and 324. Offered: jointly with MATH 517.

AMATH 518 Topics In Applied Optimization (3) Problems and techniques in special areas of optimization, such as engineering design, resource management, stochastic programming, games, variational inequalities, and parameter identification in mathematical modeling. Prerequisite: 515 or permission of instructor. Offered: jointly with MATH 518; odd years.

AMATH 519 Tensor Analysis (3) Cartesian tensors; motivation, manipulation, applications. Riemannian space; Christoffel symbols, geodesics, covariant differentiation. Curvature tensor, geodesic deviations, flat space. Special local coordinate systems. Applications to classical mechanics, continuum mechanisms, electromagnetism, relativity. Special topics. Prerequisite: 401 or MATH 324, or permission of instructor. Offered: jointly with MATH 519; odd years.

AMATH 520 Mathematical Modeling (3) Processes used in physical, biological, and economic sciences, as well as in engineering, for providing mathematical descriptions of various problems pertinent to these disciplines. Emphasis on the modeling rather than on the solution. Students must have an undergraduate background in one or more mentioned areas. Offered: W.

AMATH 521 Mathematical Ecology (4) Emphasis on the dynamics of populations. Topics include single-species deterministic and stochastic models, delays, discrete systems, bifurcations, multiple-species interactions (competition, predation, mutualism), oscillations and chaos, optimal control theory, resource management, age-structured models, and multi-sex models. Prerequisite: 402 or equivalent. Offered: Sp.

AMATH 530 Parallel Numerical Algorithms (3) Characteristics of parallel architectures, design and complexity analysis of parallel algorithms (communication, speedup, execution time, problem decomposition, problem ordering, problem mapping issues), parallel methods for elliptic PDEs, parallel methods for parabolic and hyperbolic PDEs, case studies of applications on current parallel machines. Prerequisite: 584 or equivalent.

AMATH 544 Water Wave Mechanics (3) Theory of water waves. Classical water wave problem and ap-

proximate solution techniques. Evolution equations and their solutions for wave systems. Viscous damping effects and mass transport. Nonlinear shallow-water waves and the Korteweg-deVries equation. Waves on beaches. Recommended: graduate-level course in fluid mechanics. Offered: jointly with CEWA 544.

AMATH 550 Mathematical Topics In Analytical Dynamics (3) In-depth study of one or more aspects of current interest in analytical dynamics, such as the stability of many body systems, resonance and passage through resonance, exact and adiabatic invariants. Prerequisites: 403, others depending on topics. Recommended: basic graduate course in analytical dynamics.

AMATH 551 Mathematical Topics In Solid Mechanics (3) Topics vary and include: foundations of plate theories; structure of linear shell theory; static-geometric duality; asymptotic solutions for nonlinear plate and shell problems; bifurcation theory and solution methods; wave propagation and stability problems in random environments. Prerequisites: 403; graduate-level course in mechanics; and others, depending on topics.

AMATH 552 Mathematical Topics In Fluid Dynamics (3) Mathematical development and foundations in fluid dynamics; topics selected from boundary layers, stability theory, turbulence, rotating-stratified fluid motion, gas dynamics. Prerequisites: 403, others depending on topics. Recommended: graduate-level course in fluid dynamics.

AMATH 563, 564 Methods of Partial Differential Equations II, III (3, 3) First-order partial differential equations: characteristics, conservation laws, shocks, applications to geometrical optics and Hamilton-Jacobi theory. Elliptic equations: fundamental solution, Green's functions, conformal mapping, boundary-value problems. Parabolic equations. Hyperbolic equations: characteristics, shocks, examples from fluid dynamics, approximate methods. Post-master's sequence. Prerequisite: 569. Offered: odd years.

AMATH 567 Analysis In Engineering and Science I (3) Complex variable and associated topics. Branch cuts, series and product expansions. Contour integration, numerical implications. Harmonic functions. Complex potential (and singularities) in physical problems. Conformal mapping; applications and examples. Fourier and Laplace transforms and applications. Recommended: 401 or equivalent. Offered: jointly with A A 567; A.

AMATH 568 Analysis In Engineering and Science II (3) Survey of practical solution techniques for ordinary differential equations. Linear systems of equations including nondiagonalizable case. Nonlinear systems; stability phase plane analysis. Poincaré maps. Asymptotic expansions. Regular and singular perturbations. Recommended: 402 or equivalent. Offered: jointly with A A 568; W.

AMATH 569 Partial Differential Equations (3) Analytical solution techniques for linear partial differential equations, discussion of how these arise in engineering and science. Transform and Green's function methods. Classification of second-order equations, theory and applications of method of characteristics. Prerequisite: 403, 568 or MATH 428 or permission of instructor. Offered: jointly with A A 569/MATH 569; Sp.

AMATH 574 Nonlinear Dynamics and Chaos (3) Overview of ways in which complex dynamics arise in nonlinear dynamical systems. Topics include bifurcation theory, difference equations, universality, Poincaré maps, routes to chaos, horseshoe maps, Hamiltonian chaos, fractal dimensions, Liapunov exponents, and the analysis of time series. Examples from biology, mechanics, and other fields. Prerequisite: 568 or equivalent.

AMATH 577, 578 Perturbation Theory I, II (3, 3) Basic concepts of asymptotic expansions with applications to linear partial differential equations. Singular perturbations: matched asymptotic expansions, boundary layers, shock layers, uniformly valid solutions, the methods of multiple scales and averaging, weakly nonlinear wave propagation problems and resonance phenomena, nonlinear wave propagation in fluid, solid and particle mechanics. Post-master's sequence. Prerequisites: 567, 568, 569, or equivalent. Offered: even years.

AMATH 581 Mathematical Problem Solving using Computers (4) Unified mathematical-computational approach to solving problems in applied mathematics. Presents student with challenging scientific problems requiring use of computers, numerical and symbolic software packages (NAG, MATLAB, NETLIB, MATHEMATICA, MAPLE), graphical techniques for data presentation and communication of scientific results. Prerequisites: 402 and 403 or equivalent. Offered: A.

AMATH 584 Applied Linear Algebra and Introductory Numerical Methods (3) Applied linear algebra: matrix operations, linear systems, matrix factorization, eigenvalues, numerical methods, applications to optimization, circuits, differential equations. Survey of numerical methods: nonlinear systems, curve fitting, ordinary differential equations, quadrature, basic ideas in partial differential equations. Offered: jointly with A A 584; A.

AMATH 585, 586 Approximate and Numerical Analysis II, III (3, 3) Advanced topics in numerical analysis. More detailed consideration of topics in 584. Emphasis on methods for partial differential equations, integral equations, finite elements, stability and accuracy, mesh generation, adaptive meshes, sparse matrices, variational methods. Post-master's sequence. Prerequisite: 584, which may be taken concurrently. Offered: jointly with A A 585, 586.

AMATH 587 Asymptotics and Special Functions (3) Origin and properties of higher transcendental functions; theoretical basis and applications of Laplace, Fourier, Bessel, Mellin transforms; asymptotic analysis, including methods of steepest descent and stationary phase, WKB. Prerequisite: 567, 568, 569, or equivalent. Offered: jointly with MATH 587.

AMATH 588 Green's Functions and Integral Equations (3) Review of Sturm-Liouville theory. Green's functions and integral representation of solution of PDE. Applications in science and engineering. Integral equations. Fredholm and Hilbert-Schmidt theories. Dual integral equations. Prerequisites: 567, 568, 569, or equivalent.

AMATH 589 Advanced Topics of Applied Analysis (3) Numerical treatment of Fredholm and Volterra equations. Singular integral equations: transform approach and complex variables methods; Wiener-Hopf and other special techniques; the Hilbert problem. Nonlinear integral equations. Prerequisite: 588 or permission of instructor.

AMATH 594, 595, 596 Special Topics in Numerical Analysis (2-3, max. 15, 2-3, max. 15, 2-3, max. 15) Such topics as linear systems, approximation theory, or the numerical solution of differential equations are covered. Offered: jointly with MATH 594, 595, 596.

AMATH 600 Independent Research or Study (*) Credit/no credit only.

AMATH 700 Master's Thesis (*) Credit/no credit only.

AMATH 800 Doctoral Dissertation (*) Credit/no credit only.

Art

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The School of Art serves a dual role within the educational structure of the University of Washington. It is both a professional school and an academic department. As a professional school it trains students for active careers in the graphic and plastic arts; as a school of the College of Arts and Sciences it offers studio and lecture courses which are open to all students. All of its course offerings and its curriculum requirements are based on the underlying philosophy that an awareness and understanding of the visual arts are necessary to a liberal education, and that liberal education is necessary to the training of a professional artist.

Undergraduate Program

Advisers

Cynthia G. Caci
Judith W. Clark
104 Art

Admission Policy for Initial-Degree-Seeking Applicants

All entering freshmen must meet with a School of Art adviser prior to being admitted as a major. Currently enrolled UW and transfer students with a minimum GPA of 2.50 may declare a major during the first meeting with a School of Art adviser. Students declaring their intention to pursue a B.A. in Interdisciplinary Visual Arts will be admitted directly into the major and may continue through the degree without review. Students who wish to pursue any of the nine B.F.A. programs (Ceramics, Fibers, Graphic Design, Industrial Design, Metals, Painting, Photography, Printmaking, Sculpture) will be admitted as premajors within the School. Continuation with full major status is competitive and based on work completed in appropriate studio classes.

Entering students who have not taken college-level studio courses do not need a portfolio. They will be expected to begin the major by completing all Studio Foundation courses. Transfer students with college-level studio art experience may submit a portfolio (photo or slide examples of studio work) in order to establish a level of proficiency in their desired major. Portfolios should be submitted to the Art Advising Office two weeks prior to the student's appointment with an art adviser.

Admission Policy for Postbaccalaureate Applicants

Postbaccalaureate art applicants must file an application through the Office of Admissions by the regular quarterly deadlines.

Subsequently applicants will receive a supplementary information form from the School of Art Advising Office. At that time, studio applicants will be asked to submit slides of their work for faculty review. Following the review, applicants will be notified by the Office of Admissions regarding their admissibility.

Postbaccalaureate applicants who hope to transfer to art from other schools, departments, or colleges on the campus may pick up a supplementary information form from the School of Art advising office. This supplementary form, a complete academic record, and slides of studio work are required and may be submitted to the School of Art advising office at any time.

Bachelor of Arts

Major Requirements

Interdisciplinary Visual Art: ART 120, 121, 122, 123, 124 and one course chosen from 131, 132, 133, 134; ART H 203 plus 10 credits from ART H 201, 202, 204, 205, 206, 330, 331 with a minimum 5 credits in non-Western art; 43 credits chosen from the following optional fields so that one option includes no more than 20 credits and the others no more than 15 credits each. These credits to be drawn from undergraduate courses in art history, ceramics, drawing, fibers, metals, painting, photography, printmaking, or sculpture, but not to duplicate the above foundations courses.

Bachelor of Fine Arts

A minimum of 198 credits is required for graduation with a Bachelor of Fine Arts degree.

Major Requirements

Ceramics: ART 120, 121, 122, 123, 124, 201, 202, 353 (15 credits), 485 (15 credits), 486 (10 credits); 15 credits selected from the following: ART 252, 255, 258, 272, 335, 337, 357; 21 studio art or related elective credits to include one course from 131, 132, 133, 134; ART H 203; 10 credits from ART H 201, 202, 204, 205, 206, 330, 331 with a minimum 5 credits of non-Western art; 3 elective art history credits.

Fibers: ART 120, 121, 122, 123, 124, 215, 224, 226, 227, 324, 326, 327; 5 additional credits from 324, 326, or 327; 15 credits of ART 428; 31 studio art or related elective credits to include one course from 131, 132, 133, 134; ART 251; ART H 203; 10 credits from ART H 201, 202, 204, 205, 206, 330, 331 with a minimum 5 credits of non-Western art.

Graphic Design: ART 120, 121, 122, 123, 124, 205, 206, 207, 366, 367, 368, 376, 377, 378, 466, 467, 468, 478, 479, 480; 13 studio art or related elective credits to include one course from 131, 132, 133, 134; ART H 203; 10 credits from ART H 201, 202, 204, 205, 206, 330, 331 with a minimum 5 credits in non-Western art; 3 elective art history credits.

Industrial Design: ART 120, 121, 122, 123, 124, 254, 261, 262, 263, 316, 317, 318, 321, 322, 422, 445, 446, 447; 19 studio art or related elective credits to include one course from 131, 132, 133, 134. ARCH 210, 211, 370; SP CMU 220; 10 credits from PHYS 110, 111, 214, 215, 216. ART H 203; 10 credits from ART H 201, 202, 204, 205, 206, 330, 331 with a minimum 5 credits in non-Western art; 3 elective art history credits.

Metals: ART 120, 121, 122, 123, 124, 258, 357, 358, 359, 457, 458, 460 (15 credits); 15 credits from 201, 202, 252, 255, 272, 335, 337; 26 studio art or related elective credits to include one course from 131, 132, 133, 134; ART H 203; 10 credits from ART H 201, 202, 204, 205, 206, 330, 331 with a minimum 5 credits in non-Western art; 3 elective art history credits.

Painting: ART 120, 121, 122, 123, 124, 132, 256, 257, 265 (10 credits), 307 (10 credits), 325, 360 (10 credits), 463 (15 credits); 21 studio art or related elective credits; ART H 203; 10 credits from ART H 201, 202, 204, 205, 206, 330, 331 with a minimum 5 credits in non-Western art; any twentieth-century art history course.

Photography: ART 120, 121, 122, 123, 124, 230, 370, 371, 372, 411 (15 credits), 10 credits from 412, 413, 414; 415 (10 credits); 31 studio art or related elective credits to include one course from 131, 132, 133, 134; ART H 203; 10 credits from ART H 201, 202, 204, 205, 206, 330, 331 with a minimum 5 credits in non-Western art; ART H 232.

Printmaking: ART 120, 121, 122, 123, 124, 247, 248, 249; 15 credits from 307, 345, 350, 355; 450 (15 credits), 455; 20 credits from 245, 256, 257, 260, 265; 16 studio art or related elective credits to include one course from 131, 132, 133; ART H 203; 10 credits from ART H 201, 202, 204, 205, 206, 330, 331 with a mini-

mum 5 credits in non-Western art; any twentieth-century art history course.

Sculpture: ART 120, 121, 122, 123, 124, 232, 253, 272, 274, 332 (10 credits), 335, 337, 436 (15 credits); 31 studio art or related elective credits to include one course from 131, 132, 133, 134; ART H 203; 10 credits from ART H 201, 202, 204, 205, 206, 330, 331 with a minimum 5 credits in non-Western art; 3 elective art history credits.

Graduate Program

Louise Cabeen, Graduate Program Coordinator

The School of Art offers nine art and design programs leading to the Master of Fine Arts degree: ceramics, fibers, graphic design, industrial design, metals, painting, photography, printmaking, and sculpture. Students are required to enroll for two years of full-time study (six quarters, excluding summer), earning a minimum of 63 credits of scheduled class work and 9 credits of thesis for a total of 72 credits. Individual programs have specific requirements.

The thesis consists of a studio project representing a body of work, a written thesis statement, and documentation in the form of slides of the work. A selection of thesis work is exhibited at the annual studio masters' exhibition of the School of Art.

Admission Requirements

Applicants for admission to the Master of Fine Arts program are required to have a Bachelor of Fine Arts degree or equivalent (determined by the quality of the applicant's work and equivalent experience, based upon the UW B.F.A. requirements of 108 studio and 18 art history quarter credit hours) with a minimum GPA of 3.00 in the undergraduate art major.

The Graduate Record Examination is *not* required. Admission is on a competitive basis. Annual deadline for applications is February 1, for admission the following autumn quarter.

Scholarships and Teaching Assistantships

School of Art scholarships are awarded annually to new and returning students, based on merit. Applicants admitted to the M.F.A. program may be offered School of Art scholarships for the coming year on an individual merit basis.

The School of Art offers a limited number of teaching assistantships to incoming graduate students on an individual merit basis, as determined by each program. Graduate students may apply for a limited number of additional, competitive teaching assistantships, which are awarded to students after the first quarter in residence.

Correspondence and Information

Graduate Program Coordinator
102 Art, Box 353440

Faculty

Director

Christopher Ozubko

Professors

Aips, Glen E. * 1945, (Emeritus); MFA, 1947, University of Washington; printmaking.

Anderson, Judy M. * 1988; MA, 1977, University of California (Berkeley); graphic and informational design for business and institutions, book artist.

Berger, Paul E. * 1978; MFA, 1973, State University of New York (Buffalo); photography.

Carragher, Ronald G. * 1967; MA, 1961, San Jose State College; photography.

Celentano, Francis * 1966, (Emeritus); MA, 1957, New York University; painting, drawing.

Dahn, Richard F. * 1965; MFA, 1959, Yale University; graphic design.

Dailey, Michael D. * 1963; MFA, 1963, University of Iowa; painting, drawing.

Du Pen, Everett 1945, (Emeritus); MFA, 1937, Yale University; sculpture.

Erickson, John W. 1956, (Emeritus); MFA, 1951, University of Illinois; painting.

Goldsmith, Layne * 1983; MA, 1975, San Jose State College; MFA, 1979, Cranbrook Academy of Art; fiber arts and related historic and contemporary textile structures and processes.

Hixson, William J. * 1950, (Emeritus); MFA, 1950, University of Oregon; painting.

Hu, Mary L. * 1980; MFA, 1967, Southern Illinois University; metal design.

Hurley, Denzil 1994; MFA, 1979, Yale University; painting, drawing, theory.

Jones, Robert C. * 1960, (Emeritus); MS, 1959, Rhode Island School of Design; painting, drawing.

Kehl, Richard L. * 1962; MA, 1961, MFA, 1961, Kansas City Art Institute; painting.

Lawrence, Jacob A. * 1971, (Emeritus); DFA (Hon.), 1981, Carnegie-Mellon University; painting, drawing.

Lundin, Norman K. * 1964; MFA, 1963, University of Cincinnati; painting, drawing.

Marshall, John C. * 1970; MFA, 1968, Syracuse University; metal design.

Mason, Aiden 1946, (Emeritus); MFA, 1947, University of Washington; painting.

Moseley, Spencer A. * 1948, (Emeritus); MFA, 1952, University of Washington; painting, drawing.

Ozubko, Christopher * 1981; MFA, 1981, Cranbrook Academy of Art; graphic design.

Pennington, Ruth E. 1926, (Emeritus); MFA, 1929, University of Washington; metal design.

Pizzuto, Eugene * 1957, (Emeritus); MFA, 1951, Cranbrook Academy of Art; painting, drawing.

Smith, Charles W. * 1948, (Emeritus); MFA, 1956, Cranbrook Academy of Art; sculpture.

Solberg, Ramona L. * 1967, (Emeritus); MFA, 1957, University of Washington; art education, metal design.

Spafford, Michael C. * 1969, (Emeritus); MA, 1960, Harvard University; painting, drawing.

Sperry, Robert H. * 1954, (Emeritus); MFA, 1955, University of Washington; ceramics.

Taylor, Norman J. * 1968; MFA, 1967, MA, 1967, University of Iowa; sculpture.

Tsutakawa, George 1947, (Emeritus); MFA, 1950, University of Washington; sculpture.

Wadden, Douglas J. * 1970; MFA, 1970, Yale University; graphic design, photography.

Warashina, M. Patricia * 1970, (Emeritus); MFA, 1964, University of Washington; ceramics.

Whitehill-Ward, John * 1975; MS, 1974, Illinois Institute of Technology; graphic design.

Young, John T. * 1984; MFA, 1978, Rhode Island School of Design; sculpture, conceptual art.

Associate Professors

Fuller, Steven 1946, (Emeritus); MFA, 1948, University of Washington; art education.

Govedare, Philip B. * 1991; MFA, 1984, Tyler School of Art; painting and drawing.

Koenig, Hazel L. * 1967, (Emeritus); MFA, 1950, University of Washington; fiber arts.

Labitzke, Curt W. * 1984; MFA, 1984, University of Notre Dame; printmaking; intaglio and lithography emphasizing hand drawn techniques.

Pawula, Kenneth J. * 1965; MA, 1962, University of California (Berkeley); painting, drawing.

Praczkowski, Edward * 1965, (Emeritus); MFA, 1965, Cranbrook Academy of Art; painting, drawing.

Proctor, Richard M. * 1957, (Emeritus); MA, 1962, Michigan State University; fiber arts.

Scheier, Shirley E. * 1986; MFA, 1985, University of Wisconsin; printmaking.

Takamori, Akio * 1988; MFA, 1978, New York State College of Ceramics; ceramic sculpture.

Walker, Jamie * 1989; MFA, 1983, Rhode Island School of Design; ceramic arts.

Welman, Valentine S. * 1954, (Emeritus); MFA, 1954, University of Colorado (Boulder); painting, drawing.

Assistant Professors

Brixey, Shawn A. 1994; MS, 1988, Massachusetts Institute of Technology; synthesis of advanced technology with visual arts and its impact on the creation of new art forms.

Cabeen, Louise * 1993; MFA, 1989, Chicago, School of Art Institute; socially critical art with research specialties in textile history and techniques.

Celentano, Denyce M. 1995; MFA, 1990, East Carolina University; painting and drawing.

Gale, Ann E. 1995; MFA, 1991, Yale University; figure painting.

Garvens, Ellen J. 1994; MA, 1983, MFA, 1987, University of New Mexico; mixed-media photography.

Scott, George W. 1995; MFA, 1993, Cranbrook Academy of Art; industrial design/design education.

St. Pierre, Louise M. 1995; BFA, 1983, University of Alberta (Canada); industrial design.

Lecturer

Nicholls, James Keith 1995; BArch, 1986, University of British Columbia (Canada); design, industrial design, construction technology.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

ART 104 Introduction to Drawing (3, max. 6) VLPA. Perspective, use of tone, line, texture. Abstract and descriptive composition. For nonmajors. Offered: AWP.

Foundation Courses

ART 120 Issues and Influences (2) VLPA. Introduction to the contemporary concerns of the various disciplines and fields of thought represented by the School of Art. Lectures from the School's ten programs regarding historical, contemporary, and future issues and directions from each of the School's ten programs. Credit/no credit only. Prerequisite: art major.

ART 121 Drawing I (5) VLPA. Drawing studied as the means of creating a coherent visual and expressive statement. Development of ability in the fundamentals of drawing: line, tone, and gesture, theory and practice of linear and aerial perspective, and basic concepts of composition. Prerequisite: art major. Offered: AWP.

ART 122 Drawing II (5) VLPA. Introduction of new materials and processes and varied conceptual approaches with greater individualization of expression and treatment of subject. Emphasis on abstract thinking as a factor in interpreting the visual world. Prerequisite: 121. Offered: AWP.

ART 123 Two-dimensional Design: Structure and Color (5) VLPA. Exploration of fundamental visual phenomena as defined by relationship and context. Compositional studies that allow for analysis of line, form, mass, tonality, and color. Exercises begin with subject interpretation and translation, progress to abstraction, and conclude with a series of variations on a visual theme. Prerequisite: art major. Offered: AWP.

ART 124 Three-dimensional Design Fundamentals (5) VLPA. Through use of a variety of materials, three-dimensional fundamentals are investigated for formal and conceptual concerns as they apply to the visual arts. Prerequisite: art major. Offered: AWP.

Foundation Electives

ART 131 Alternative Approaches to Art and Design (5) VLPA. Presentation of process through which artists discover and translate ideas, feelings, and concerns into images or objects. Use of a wide variety of methods and approaches, from traditional to technological, to promote visual expression. Discussion and critiques leading toward better understanding the creative process. Prerequisites: foundation courses.

ART 132 Introduction to Figure Drawing (5) VLPA. Introduction to the human figure as historically traditional subject matter as well as an important component in self expression. Covers proportion, foreshortening, and composition. Prerequisites: foundation courses.

ART 133 Color Theory and Practice (5) VLPA. Examination of color as distinct visual phenomenon with investigations of its practical, theoretical, and illusionary aspects. Various media and materials employed in exercises and compositions that demonstrate properties of color structure, symbolism, and perception and their potential applications to art and design. Prerequisites: foundation courses.

ART 150 Three-dimensional Design Fundamentals (5) VLPA. Introduction to fundamentals of three-dimensional design process. Both practical and conceptual skills explored and demonstrated through assigned project or projects. Prerequisites: art major and permission of instructor.

ART 201 Ceramic Art: Handbuilding (5) VLPA. Introduction to handbuilding; kiln firing and glazing processes. Examination of contemporary sculpture in clay. Prerequisites: foundation courses.

ART 202 Ceramic Art: Wheel Throwing (5) VLPA. Introduction to wheel throwing, glazing, and kiln firing processes. Examination of contemporary vessel form in clay. Prerequisites: foundation courses.

ART 205 Graphic Design (5) VLPA. Basic graphic design problem solving. Prerequisites: foundation courses and pre-graphic design major.

ART 206 Graphic Design (5) VLPA. Basic graphic design problem solving. Prerequisite: 205.

ART 207 Typographic Design: Methods and Processes (5) VLPA. Investigates operational typographic and reproduction methods as a foundation for two-dimensional design and laboratory assignments. Primary objective is understanding computerized photo-typesetting, offset lithography, and photomechanical techniques as they relate to the design process. Prerequisite: 206.

ART 215 Principles of Dyes and Dyeing (5) VLPA. History of dyes and dyed textiles from ancient world use through current industrial practices. Emphasis on dye studio practices and practical application of vari-

ous dyes for accuracy and safety. Fiber preparation, dye fixation, and record-keeping of dye tests. Prerequisites: art major.

ART 224 Introduction to Fibers (5, max. 10) VLPA Exploration of the development of cloth as a basis for study of the relationship between materials, meaning, and process. Technical skills acquisition designed to follow sequential evolution of clothmaking from found to built to embellished. Prerequisite: art major.

ART 226 Weaving I (5) VLPA Basic techniques and processes of four-harness loom woven structures. Fundamentals of drafting and loom design and operation, including study of fiber technology and dye chemistry. Prerequisite: foundation courses.

ART 227 Surface Design I (5, max. 15) VLPA Printing and dyeing of textiles. Techniques include block printing, batik, tie and dye, discharging. Prerequisites: foundation courses.

ART 230 Introductory Photography (5) VLPA Introduction to theory, techniques, and processes of still photography. Emphasis on darkroom procedures and camera use. Projects stress the visual and creative potential of the medium. Students must provide a camera with lens, shutter, and aperture controls. Prerequisite: foundation courses and permission of adviser.

ART 232 Conceptual Art Studio (5) VLPA Beginning level conceptual art sculpture studio focusing on non-traditional formats, idea oriented artworks, and performance art. Prerequisite: foundation courses.

ART 245 Concepts in Printmaking (5) VLPA Introduction to contemporary printing methods such as monotype, monoprint, stencil, and photocopy. Survey of historical and current approaches to the art of printmaking. Prerequisites: foundation courses.

ART 247 Intaglio (5) VLPA Monotype, collage, dry point, etching, engraving, and aquatint. Photographic and hand-drawn methods. Black and white and color work. Historical overview with emphasis on contemporary developments. Prerequisites: foundations courses.

ART 248 Lithography (5) VLPA Metal plate lithography, photographic, and hand-drawn methods. Traditional stone lithography. Black and white and simple color printing. Historical overview with emphasis on contemporary developments. Prerequisites: foundation courses.

ART 249 Serigraphy (5) VLPA Water-based silk screen printing. Paper stencil, photographic process, and hand-drawn methods. Emphasis on color printing on a wide range of surfaces and materials. Historical overview with emphasis on contemporary developments. Prerequisites: foundation courses.

ART 251 History of Textiles (3) VLPA Overview of Western textiles from Coptic tapestry through industrialization. Discussion of textiles not only in aesthetic terms but also as cultural documents arising from, and reflecting, a broad range of societal pressures and concerns. Special topics in contemporary issues and non-Western textiles with emphasis on holdings in the University collection.

ART 253 Design and Materials: Wood (5) VLPA Shaping and forming of wood. Lamination and fabricating techniques. Use of hand and power tools. Prerequisites: foundation courses.

ART 254 Design and Materials: Metal (5) VLPA Basic techniques in manipulation and construction of metals. Prerequisites: foundation courses.

ART 256 Painting (5) VLPA Beginning oil painting. Prerequisites: foundation courses.

ART 257 Painting (5) VLPA Oil painting. Prerequisite: 256.

ART 258 Jewelry Design (5) VLPA Introduction to jewelry design and construction through techniques of

sawing, filing, soldering, forging, and casting in silver, copper, bronze, and brass, as well as simple stone setting. Prerequisites: foundation courses.

ART 259 Water-Soluble Media (5, max. 15) VLPA Prerequisites: foundation courses.

ART 260 Art Works on Paper (5, max. 15) VLPA Experiments and projects in various techniques of drawing, assemblage, and painting on paper. Prerequisite: 257.

ART 261, 262, 263 Introduction to Industrial Design (5, 5, 5) VLPA Fundamentals of three-dimensional design. Form studies in relation to geometry, structure, value, production, meaning, and context. Prerequisites: foundation courses and permission of instructor for 261; 261 for 262; 262 for 263.

ART 265 Intermediate Drawing (5, max. 15) VLPA Prerequisites: foundation courses.

ART 272 Beginning Sculpture Composition (5) VLPA Fundamentals of composition in the round and relief. Prerequisites: foundation courses.

ART 275 A World History of Art in Public Places (5) VLPA Historical introduction to, and overview of, the placement of art in the public domain, examining major visual and conceptual developments in the history of art. Examples of how various public artworks have manifested or been affected by elements of these developments.

ART 276 Contemporary Directions: Art in Public Places (5) VLPA Contemporary directions in public art focusing on innovative public artworks, artists, and art programs of Washington State. Prerequisite: 275.

ART 280 Media, Time, and Technology Arts (5) VLPA Develops a "new genre" attitude towards exploration and research in contemporary visual arts, based on computer/ human interface and electronic technology. Includes performance art, environmental art, sound art, light art, video art, interactive installation, kinetic art, conceptual art. Prerequisites: foundation courses and 131.

ART 307 Intermediate Painting (5, max. 10) VLPA Prerequisite: 257.

ART 309 Portrait Painting (5, max. 10) VLPA Prerequisite: 10 credits in 307.

ART 316, 317, 318 Design for Industry (5, 5, 5) VLPA Product design, working drawings, models, presentation drawings, product analysis, display, marketing. Prerequisites: junior standing in industrial design for 316; 316 for 317; 317 for 318.

ART 321 Furniture Design (5) VLPA Design of a furniture piece. Methodologies and construction, types of hardware, special shop techniques, scale modeling and full-scale functional designs.

ART 322 Presentation for Industrial Design I (5) VLPA Introduction to presentation skills, from quick sketching of design concepts to refined representation of the finished design in a two-dimensional format. Emphasis on accuracy and development of an individual style. Prerequisite: industrial design major.

ART 323 Presentation for Industrial Design II (5) VLPA Techniques to progress from design control drawings to three-dimensional models, including both study models and finished appearance models, in order to communicate design concepts in a professional, effective manner.

ART 324 Alternative Approaches: Fiber Arts (5, max. 10) VLPA Constructed, patterned, embellished, and found textiles used as a basis for challenging underlying assumptions about cloth. Uses alternative methods of pattern development and surface enhancement to interpret, invent, or discover a vocabulary of visual expression.

ART 325 Advanced Drawing (5, max. 15) VLPA Study at an advanced level involving history, practice, and theory of drawing as an art form. Prerequisite: 15 credits in 265.

ART 326 Weaving II (5) VLPA Introduction to weaver-controlled structures and tapestry weaving. Alternative weaving tools and loom construction; studio dyeing processes. Prerequisite: 226.

ART 327 Design for Printed Fabrics (5, max. 15) VLPA Hand-block and silk-screen printing; mass-production design. Prerequisite: 227.

ART 332 Intermediate Sculpture Composition (5, max. 15) VLPA Advanced work in various media and techniques. Prerequisite: 272.

ART 335 Metal Casting (5, max. 15) VLPA Introduction to foundry techniques as applied to fine arts casting of ferrous and nonferrous material. Prerequisite: 272.

ART 337 Metal Fabrication (5, max. 10) VLPA Study and application of metal fabrication methods as they apply to sculpture techniques, making use of oxyacetylene, electric arc, and heliarc. Prerequisite: 272.

ART 345 Intermediate Printmaking (5, max. 15) VLPA Development of mature and personal statement within context of the print form through studio practice and group discussion and critique. Processes and media emphasis varies on a revolving basis. Prerequisites: art major and 247, 248, or 249.

ART 350 Printmaking Special Projects (5, max. 15) VLPA Revolving topics of special interest to printmaking students beyond basic technical instruction found in beginning level courses. Prerequisite: foundation courses.

ART 352 Images on Paper (5, max. 10) VLPA Combines traditional printmaking with drawing and painting. Experimental in nature. Student works with various media and, in translating an image from one medium to another, deals with the unique characteristics of each. Prerequisites: foundation courses.

ART 353 Intermediate Ceramic Art (5, max. 15) VLPA Advanced work in forming, decorating, and glazing. Prerequisites: 201, 202, and permission of adviser.

ART 355 Rendering and Presentation: Metal Smith (5) VLPA Rendering and presentation for the metal smith. Prerequisites: major standing and permission of adviser.

ART 356 Project Design for Industrial Processes (5) VLPA Machine techniques for the design artist. Students learn to use lathe, shaper, and vertical and horizontal mills through a series of design problems. Prerequisite: foundation courses and permission of adviser.

ART 357 Holloware (5) VLPA Processes of raising, soldering, forging in copper, pewter, silver. Prerequisites: foundation courses.

ART 358 Jewelry Design (5) VLPA Etching, reticulation, makume, electroforming, repousse, and chasing as well as advanced stone setting methods. Prerequisite: 258.

ART 359 Enameling (5) VLPA Enamel design for metal work or jewelry, champleve, plique-a-jour, Limoges, cloisonne on copper, silver, or gold. Prerequisite: permission of instructor.

ART 360 Life (5, max. 10) VLPA Drawing and painting from the model. Prerequisites: 257 and 15 credits in 265.

ART 361 Art Techniques (5, max. 15) VLPA Study of materials and techniques of the artist and their application to painting and drawing. Prerequisite: 257.

ART 366, 367, 368 Graphic Design (5, 5, 5) VLPA 366: visualizations; 367: basic three-dimensional design; 368: persuasive communications. To be taken concurrently with 376, 377, 378. Prerequisites: 207 for 366; 366 for 367; 367 for 368.

ART 370 Intermediate Photography I (5) VLPA Projects in photography. Assignments combine technical and conceptual objectives. Prerequisites: 230 and permission of adviser.

ART 371 Intermediate Photography II (5) VLPA Creative application of extended photographic processes such as non-continuous tone films, electrostatic materials, photo montage, and collage. Emphasis on sequencing in time-based or book formats. Prerequisites: 370 and permission of adviser.

ART 372 Intermediate Photography III (5) VLPA Introduction to photographic color theory and processes with emphasis on color printing on type C darkroom printing. Additional traditional and experimental color materials explored. Prerequisites: 370 and permission of adviser.

ART 376, 377, 378 Graphic Design (5, 5, 5) VLPA 376: fundamentals of typography; 377: two-dimensional composition; 378: intermediate visual communications. To be taken concurrently with 366, 367, 368. Prerequisites: 207 for 376; 376 for 377; 377 for 378.

ART 380 Video Art and Video Installation (5) VLPA Exposes students to broad range of high-end video industry equipment, terminology and production/post skills while viewing art works and creating alternative activities and ideas. Work in electronic image gathering, digital A/B roll editing, motion control, video as related to performance and environmental art. Prerequisite: foundation courses, 131, and 280. Offered:

ART 411 Advanced Photography (5, max. 15) VLPA Topics in advanced photography, including: color printing, large-format photography, artificial lighting, and photography image transformation. Prerequisites: 371, 372, and permission of adviser.

ART 412 Contemporary Issues in Photography (5) VLPA An in-depth survey of contemporary artists and issues in photography. Students produce art works that respond, react, and perhaps contradict these developments and trends. Prerequisites: 371, 372, and permission of adviser.

ART 413 Digital Imaging I (5) VLPA Creative approach to image manipulation and transformation in two-dimensional space on both IBM and Macintosh platforms. A variety of program, procedures, hardware, input, and output considered and employed. Prerequisites: 371, 372, and permission of adviser.

ART 414 Digital Imaging II (5) VLPA Berger Digital imaging on both IBM and Macintosh platforms. Emphasis on creative art approach to 2-D collaging and morphing with introduction to 3-D modeling and rendering. Prerequisites: 413.

ART 415 Senior Thesis in Photography (5, max. 10) VLPA Development of a coherent photographic theme or topic evolved over two consecutive quarters resulting in a finished thesis portfolio. Prerequisites: 411 and permission of adviser.

ART 422 Industrial Design Computer Graphics (3) VLPA Prerequisite: senior standing in industrial design.

ART 426 Advanced Weaving (5, max. 10) VLPA Loom- and weaver-controlled structures. Topics may include warp patterning, warp painting, printing and dyeing, ikat, and multiple-harness weaves. Prerequisite: 326.

ART 428 Senior Thesis in Fiber Arts (5, max. 15) VLPA Specialized investigation involving surface design and/or fabric structures. Prerequisite: permission of instructor.

ART 436 Sculpture Composition (5, max. 15) VLPA Individual compositions in various media in large scale. Prerequisites: 15 credits in 332 and permission of adviser.

ART 445, 446, 447 Advanced Industrial Design (5, 5, 5) VLPA Market analysis and selected professional problems in industrial design. Consultation techniques; psychological, sociological, and economic factors involved in designing for consumer acceptance. Prerequisites: 318 for 445; 445 for 446; 446 for 447.

ART 450 Individual Projects in Printmaking (6, max. 15) VLPA Individual media study within the context of group discussion and critique. Prerequisite: art major and 247 or permission of instructor.

ART 455 Advanced Printmaking (5) VLPA In-depth work and critical discussion for senior printmaking students. Prerequisites: successful completion of BFA review and permission of instructor.

ART 456 Wire Construction (5) VLPA The use of wire to create both jewelry-scale and larger sculptural forms. Translation of textile processes such as coiling, knitting, braiding, and weaving into metal and into development of chains, chain mail, and mesh systems. Prerequisites: 258, 357, and permission of instructor.

ART 457 Advanced Holloware (5) VLPA Individual problems in metal design and construction. Prerequisite: 357.

ART 458 Advanced Jewelry Design (5) VLPA Individual problems in jewelry design and construction. Prerequisite: 358.

ART 459 Advanced Enameling (5) VLPA Individual problems in enameling. Prerequisite: 359.

ART 460 Advanced Metal Design (5, max. 15) VLPA Advanced individual projects in metal design. Prerequisite: permission of instructor.

ART 481 History of Body Adornment (3) VLPA Covers jewelry and other body adornment from Neolithic times to the present, worldwide. Discusses social and cultural relevance of forms, uses, and materials. Emphasis on today's studio craftspeople who make jewelry as a form of aesthetic expression outside the fashion mainstream.

ART 483 Advanced Painting (5, max. 15) VLPA Development of individuality in painting through creative exercises. Prerequisites: 10 credits in 307 and 10 credits in 360.

ART 484 Advanced Painting/Drawing (5, max. 15) VLPA Advanced problems in composition. Prerequisite: 15 credits of 463.

ART 466, 467, 468 Graphic Design (5, 5, 5) VLPA 466: advanced two-dimensional design; 467: exhibition design; 468: independent study. To be taken concurrently with 478, 479, 480. Prerequisites: 368 and 378 for 466; 466 for 467; 467 for 468.

ART 478, 479, 480 Graphic Design (5, 5, 3) VLPA 478: information design I; 479: information design II; 480: design programs. To be taken concurrently with 466, 467, 468. Prerequisite: 368 and 378 for 468; 468 for 479; 479 for 480.

ART 485 Advanced Ceramic Art (5, max. 15) VLPA Pottery design and construction, stoneware, clay bodies, glazes. Prerequisites: 15 credits in 353 and permission of instructor.

ART 486 Individual Projects in Ceramics (3-5, max. 15) VLPA Advanced individual projects in ceramics with emphasis on pottery, sculpture, kiln building, presentation, and historical and contemporary directions in clay. Prerequisite: 15 credits in 485 and permission of instructor.

ART 496 Undergraduate Internship (2-5, max. 10) Faculty supervised fieldwork in art related activities.

Credit/no credit only. Prerequisites: upper-division standing in art and permission of adviser.

ART 497 Study Abroad—Studio Individual Projects (3-10, max. 20) VLPA Prerequisite: permission of adviser.

ART 498 Individual Projects—Painting/Sculpture (3/5, max. 15) Prerequisite: permission of instructor.

ART 499 Individual Projects—Design (3/5, max. 15) Prerequisite: permission of instructor.

Courses for Graduates Only

ART 512 Graduate Seminar (3, max. 9)

ART 513 Contemporary Studio Theories and Problems (3)

ART 515 Photography (3-15, max. 60)

ART 520 Seminar in Painting (3, max. 18) Designed as a forum for the presentation and criticism of student work as well as for discussion of contemporary directions in visual art. Credit/no credit only.

ART 522 Sculpture (3-15, max. 60)

ART 540 Fiber Arts (3-15, max. 60)

ART 547 Industrial Design (3-15, max. 60)

ART 550 Printmaking (3-15, max. 60)

ART 553 Ceramic Art (3-15, max. 60)

ART 558 Metal Design (3-15, max. 60)

ART 563 Painting (3-15, max. 60)

ART 580 Graphic Design (3-15, max. 60)

ART 595 Master of Fine Arts Research Project (2-5, max. 9) An independent research project related to and informed by the MFA student's studio work. Final project form may be a lecture, slide presentation, or paper.

ART 600 Independent Study or Research (*)

ART 700 Master's Thesis (1, max. 9)

Art History

209 Art

Art history is the study of the creation, style, and meaning of works of art in relation to the artists and societies that created them. The history of art involves the interaction of styles, techniques, concepts, individual personalities, and social values from many places over long periods of time. This discipline is comparative in nature and requires many different skills, derived from the study of history and culture, foreign languages and literature, iconography, stylistic analysis, and connoisseurship.

Undergraduate Program

Adviser
Judith W. Clark
104 Art

Bachelor of Arts

Admission Requirements: All entering freshmen must meet with a School of Art adviser prior to being admitted as a major. Currently enrolled UW and transfer students with a minimum GPA of 2.00 may declare a major during the first meeting with a School of Art adviser.

Postbaccalaureate applicants must file an application through the Office of Admissions by the regular quarterly deadlines. Subsequently applicants will receive a

supplementary information form from the School of Art Advising Office. Following School of Art review of the form, applicants will be notified by the Office of Admissions regarding their admissibility.

Major Requirements: 55 credits in art history, including four core courses covering art history in a variety of cultural contexts—ART H 201, 202, 290, 340, 341, 342, 343, 351, 352, or 373; 204, 306, 311, 315, 316, or 321; 205, 206, 230, 330, 331, or 337; 203, 232, 380, 381, 382, or 384; and three 400-level art history courses.

One of the following options: (1) 15 credits from ART 121, 122, 123, or 124; or (2) 15 upper-division credits in one of the following areas (exclusive of courses offered jointly with art history): Ancient and Medieval History, Anthropology, Asian Languages and Literature, Classics, Comparative Literature, Comparative Religion, English Literature, French and Italian Studies, Germanics, History of the Americas, History of Asia, Modern European History, Near Eastern Languages and Civilization, Philosophy, Scandinavian Languages and Literature, Slavic Languages and Literature, or Spanish and Portuguese Studies.

Graduate Program

Robin Wright, Graduate Program Coordinator

Master of Arts

Admission Requirements: (1) Bachelor of Arts degree with major in the history of art, or equivalent course work; (2) two copies of all academic transcripts; (3) three letters of recommendation; (4) statement of professional objectives in the field; and (5) samples of the applicant's written work. Taking the Graduate Record Examination is required.

Graduation Requirements: (1) 55 credits in the thesis track or 65 credits in the nonthesis track. Of these credits, a minimum of 45 credits in the thesis track or 55 credits in the nonthesis track must be numerically graded art history courses numbered 400 and above, exclusive of thesis or practicum credits. A maximum of 10 credits in related fields, in numerically graded courses numbered 300 and above, may be approved for credit in place of art history courses. No more than 12 credits of ART H 600 may be counted toward the minimum credit requirement for the Master of Arts degree; (2) a minimum of 5 numerically graded credits must be taken in four of five major areas: 1) African, Native American, and Oceanic, 2) East Asian, 3) Ancient, Classical, and Medieval, 4) Italian and Northern Renaissance, Baroque, and Rococo, 5) late eighteenth–twentieth-century Western; (3) a minimum of 15 credits must be taken in 500-level seminars, in addition to ART H 500, *Methods of Art History*, which must be taken within the first year of residence. At least one seminar each in a Western and a non-Western area is required; (4) a reading knowledge of German or French, or of Chinese or Japanese if appropriate, as well as a research capability in a second language adjudged appropriate to the student's area of study. Language requirements may be satisfied either by passing the Graduate School Foreign Language Test (available in German, French, Spanish, and Russian only) with a minimum score of 550, or by completing the third quarter of second-year French, German, Chinese, Japanese, or other appropriate language as a graduate student at the UW with a minimum grade of 3.0; (5) students in the thesis track must take 10 thesis credits in ART H 700 in preparation for the written presentation and oral defense of a thesis that demonstrates the ability to conduct rigorous research, familiarity with relevant sources, and a capacity for synthesis and critical evaluation; students in the nonthesis track must take 10 practicum credits in ART H 598, a practical or theoretical program designed in conjunction with the faculty and defended by means of a final written report and oral examination.

Doctor of Philosophy

Admission Requirements: (1) Prior sound preparation in art history at a general level, which usually means having acquired the Master of Arts degree in the history of art; (2) two copies of all academic transcripts; (3) three letters of recommendation; (4) statement of professional objectives in the discipline; and (5) samples of written research work in art history. Taking the Graduate Record Examination is required.

Graduation Requirements: Minimum of 90 credits, which include: (1) 60 credits in art history courses numbered 400 and above, beyond the Master of Arts degree or equivalent, and exclusive of dissertation credits; a maximum of 20 credits in related fields in numerically graded courses numbered 300 and above may be approved for credit in place of art history courses; a minimum of 10 credits must be in areas other than those tested by the General Examination; at least 30 credits must be in 500-level seminars; (2) a reading knowledge of German or French, or of Chinese or Japanese if appropriate; a research capability in a second language adjudged appropriate to the student's area of study; a knowledge of any other languages considered necessary by the faculty. Language requirements may be satisfied by passing the Graduate School Foreign Language Test (available in German, French, Spanish, and Russian only) with a minimum score of 550, or by completing the third quarter of second-year French, German, Chinese, Japanese, or other appropriate language as a graduate student at the University of Washington with a minimum grade of 3.0; (3) a General Examination, written and oral, taken prior to enrollment for dissertation credits; this examination covers three specific fields of art history chosen from the following general areas: African; Native American; Chinese; Japanese; Ancient; Medieval; Renaissance; Baroque and eighteenth century; Modern; no more than two fields may be selected from the same area; (4) 30 dissertation credits in ART H 800 taken after the General Examination in preparation and defense of the dissertation. These credits must be distributed over a minimum of three quarters; (5) a dissertation demonstrating original and independent investigation and achievement.

Financial Aid

The Art History division offers certain scholarship funds, as well as teaching assistantships, for art history graduate students. A limited number of grants are awarded to outstanding entering students, but it is otherwise a policy to award financial aid and assistantships only to students who have completed at least one year of graduate study.

Correspondence and Information

Graduate Program Coordinator
209 Art, Box 353440

Faculty

Professors

Bliquez, Lawrence J. * 1969; PhD, 1968, Stanford University; Greek oratory, Greek historiography and historians, Greek and Roman medicine.

Bravmann, René A. * 1972; PhD, 1971, Indiana University; African art, Oceanic.

Christofides, Constantine * 1966, (Emeritus); PhD, 1956, University of Michigan; medieval, seventeenth-century, Romanesque.

Clausen, Meredith L. * 1979; PhD, 1975, University of California (Berkeley); aesthetics and twentieth-century architecture.

Hildebrand, Grant * 1948; MArch, 1964, University of Michigan; history, preservation design.

Holm, Bill * 1968, (Emeritus); MFA, 1951, University of Washington; Northwest coast Indians.

Kartsonis, Anna D. * 1983; PhD, 1982, New York University; Byzantine and medieval art.

Kingsbury, Martha * 1968; PhD, 1969, Harvard University; nineteenth and twentieth centuries.

Opperman, Hal N. * 1967, (Emeritus); PhD, 1972, University of Chicago; seventeenth- and eighteenth-century European.

Pundt, Hermann G. * 1968; PhD, 1969, Harvard University; history, historical preservation.

Silbergeld, Jerome * 1975; PhD, 1974, Stanford University; Chinese art.

Snow-Smith, Joanne * 1981; PhD, 1976, University of California (Los Angeles); Italian Renaissance.

Associate Professors

Falling, Patricia A. * 1982; MA, 1974, University of California (Berkeley); contemporary art and criticism.

Langdon, Merle K. * 1976; PhD, 1972, University of Pennsylvania; Greek archaeology, epigraphy, topography, and history.

Oliver, Marvin E. 1974, (Adjunct); MFA, 1973, University of Washington; Northwest coast Indian art, Native American art, wood design, glass, metals.

Wright, Robin K. * 1983; PhD, 1985, University of Washington; Native American art, particularly Northwest coast Indian art.

Assistant Professors

Collins, Jeffrey L. 1994; MA, 1989, Yale University; MA, 1992, Cambridge University (UK); PhD, 1994, Yale University; European Baroque art and architecture with an emphasis on Italy; American material culture.

Hallett, Christopher * 1993; PhD, 1993, University of California (Berkeley); Egyptian, Greek, Roman arts and archaeology.

Reed, T. Gervais 1950, (Emeritus); BA, 1949, Yale University; American, film.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

200-level courses in the history of art are intended for nonmajors, although they are also open to majors. They are designed to give an introduction to the subject matter of broad areas and to the history of art as a humanistic study. There are no prerequisites; each course is completely independent.

ART H 201 Survey of Western Art—Ancient (5) VLPA Major achievements in painting, sculpture, architecture, and the decorative arts in Europe, the Near East, and North Africa, from prehistoric times to the beginnings of Christianity. Offered: A.

ART H 202 Survey of Western Art—Medieval and Renaissance (5) VLPA The arts of the Byzantine Empire, Islam, and Western Christendom through 1520 AD. Offered: W.

ART H 203 Survey of Western Art—Modern (5) VLPA Western art from 1520 to the present. Offered: Sp.

ART H 204 Survey of Asian Art (5) VLPA Origins and interplay of major movements of South and East Asian art.

ART H 205 Survey of Tribal Art (5) VLPA/IS Arts of Sub-Saharan Africa and Oceania from prehistoric times to the present and to the pre-Columbian arts of the Americas.

ART H 206 Survey of Native American Art (5) VLPA/IS Introduction to Native American art north

of Mexico, prehistory through the twentieth century. Regional examination of types and styles, with emphasis on aesthetics, cultural function, and factors of change.

ART H 230 African-American Art (3) VLPA/I&S History of African-American art from colonial times until the present, the African background and its extensions into the West Indies, Brazil, and Surinam.

ART H 232 Photography: Theory and Criticism (3) VLPA/I&S Art traditions of photography from its origins in the nineteenth century to the present. Emphasis on photographic traditions and photographers of the twentieth century.

ART H 290 History of Architecture (5) VLPA/I&S Introduction to the history of architecture across a broad range of cultural contexts.

300-level courses cover narrower times, spaces, and types of art than 200-level surveys and constitute the core curriculum for majors (although most enrollees come from other majors). Good basic university preparation (equivalent to upper-division standing) is needed. Relevant 200-level courses, although not required, may provide helpful background.

ART H 306 Indian Art of South Asia (5) VLPA Development of Indian art from its origins to the medieval period. Spread of Indian religions and related art forms in Tibet and Southeast Asia briefly introduced.

ART H 309 Topics in Art History (5, max. 15) VLPA Topics vary.

ART H 311 Chinese Art (5) VLPA/I&S Overview of the arts of China. Emphasis on the role of the arts in Chinese culture and on the traditional styles and techniques associated with each of the major media—painting, ceremonial bronzes, architecture, sculpture.

ART H 315 The Buddhist Art of East Asia (5) VLPA Buddhist painting and sculpture of China, Korea, and Japan. Its religious meaning, artistic development, and historical significance. Examples from the sixth to the seventeenth centuries, along with paintings and contemporary carvings.

ART H 316 Japanese Painting (5) VLPA Japanese painting traditions from earliest times to the present. Examples illustrated and discussed in the context of Japanese cultural history. Analysis of painting styles as well as of the roles artists have played and the meaning their works have had in Japanese society.

ART H 317 Chado—Japanese Esthetics (4) VLPA History, theory, and practice of chado, or Way of Tea, a Zen-inspired art that has had notable effects on Japanese society. Lectures on esthetics and cultural history supplemented by participation in chado, with the goal of developing sufficient understanding and skill to continue chado as a discipline.

ART H 321 Arts of Japan (5) VLPA/I&S The spectrum of Japanese art from prehistory to modern times. Examines the interrelationship of the major media for each historical period. Central theme: the appreciation of the varied aesthetics active in the development of Japanese painting, architecture, sculpture, and ceramics.

ART H 330 Tribal Art and Philosophy (5) VLPA/I&S Philosophical inquiry and thought in African, Ameri-Indian, and Pacific island societies as expressed through the visual, musical, choreographic, and oral arts. Natural, moral, and ethical ideas as expressed in the arts.

ART H 331 Northwest Coast Indian Art (5) VLPA/I&S Native American art of the Pacific Northwest Coast from precontact to the present, from the Columbia River in the south to Southeast Alaska in the north. Differences in tribal styles and social functions; changes occurring over time as the result of sharing between tribal groups and the impact of the arrival of Europeans. Offered: jointly with ANTH 331.

ART H 337 African Art and Society (5) VLPA/I&S Explores the ideas and notions expressed visually in sculpture, painting, ceramics, textiles, and architecture and describes their relationships to man and culture in Africa.

ART H 340 Pre-Classical Art and Archaeology (3) VLPA Art and the other material remains of the civilizations in the Aegean from the Neolithic period to the end of the Bronze Age, with special emphasis on Minoan Crete and the Mycenaean kingdoms of mainland Greece; illustrated by slides. The history, techniques, and results of significant excavations. Offered: jointly with CL AR 340.

ART H 341 Greek Art and Archaeology (3) VLPA Material remains and the developing styles in sculpture, vase painting, architecture, and the minor arts from the Geometric to the Hellenistic periods; illustrated by slides. Principal sites and monuments, as well as techniques and methods of excavation, are examined in an attempt to reconstruct the material culture of antiquity. Offered: jointly with CL AR 341.

ART H 342 Roman Art and Archaeology (3) VLPA Roman architecture and art, with emphasis on the innovations of the Romans; illustrated by slides. Offered: jointly with CL AR 342.

ART H 343 Hellenistic Art and Archaeology (3) VLPA Art of Greece and the eastern Mediterranean from the time of Alexander the Great to the Roman conquest. Principal sites with their sculpture, painting, mosaics, and minor arts examined in lectures with slides. Offered: jointly with CL AR 343.

ART H 350 The City of Cairo (3) VLPA/I&S Development of Fustat and Cairo, 600-1800, with special emphasis on art and architecture. Economic, social, and geographic influences on the creation of the distinctive Egyptian styles of Islamic art. Offered: jointly with NEAR E 350.

ART H 351 Early Medieval and Byzantine Art (5) VLPA/I&S Christian art and architecture of the Roman and Byzantine empires and of western Europe through the eighth century.

ART H 352 High and Late Medieval Art (5) VLPA VLPA/I&S Art and architecture of western Christendom from the time of Charlemagne to the Renaissance.

ART H 361 Italian Renaissance Art (5) VLPA Sculpture, painting, and architecture from 1300 to 1600.

ART H 366 Northern Renaissance Art (5) VLPA An overview of Dutch, Flemish, and German art in the context of religious, historical, and stylistic developments during the Renaissance in Northern Europe (c. 1400-1570).

ART H 372 Rococo to Romanticism (5) VLPA Mainstream of European art and architecture from about 1710 to about 1830. Attention is also given to central and eastern Europe, Scandinavia, and the colonial Americas.

ART H 373 Southern Baroque Art (3) VLPA Art of Italy and Spain, circa 1590 to circa 1710.

ART H 374 Northern Baroque Art (3) VLPA Art of France, England, and the Low Countries, circa 1590 to circa 1710.

ART H 380 Nineteenth- and Twentieth-Century Art (5) VLPA Arts and architecture of Europe and America from Romanticism to the present.

ART H 381 Art Since World War II (5) VLPA/I&S Art of Europe and the United States in the decades since World War II: painting, sculpture, and architecture, multiplication of new forms (video, performance pieces, land and installation pieces), changing context of patronage, publicity, and marketing.

ART H 382 Theory and Practice of Art Criticism (3) VLPA Major issues in art and architectural criticism: nature of art criticism, aims of the critic, differences between art and architectural criticism. Works by major critics and artists, mostly twentieth century.

ART H 384 American Art (5) VLPA/I&S Achievements and issues in painting, architecture, sculpture, and other arts in the United States from the colonial era to the present.

ART H 399 Study Abroad: Art History Individual Projects (3-10, max. 20) VLPA For participants in Study Abroad programs. Prerequisite: permission of undergraduate adviser.

400-level courses are intensive, quite narrow in scope, and addressed to current scholarly problems. A relatively high level of sophistication is needed. In general, sound prior humanistic training and knowledge of at least one of the following are required: art of the period or region at a general level (such as that provided by the relevant 200- or 300-level course); social or cultural history of the subject area; literature and thought of the area; or an appropriate foreign language. 400-level courses are available for both undergraduate and graduate credit. Each 400-level course is accompanied by two units of ART H 599, required of graduate majors.

ART H 400 Art History and Criticism (2-5, max. 15) VLPA Courses on special topics, frequently by visiting faculty, which cannot be offered on a continuing basis. Consult Art History office for subjects offered.

ART H 411 Traditional Chinese Architecture (3) VLPA/I&S Introduction to Chinese architecture (palaces, homes, temples, tombs), urban planning, and gardens; each area examined in terms of techniques of production, visual styles, historical development, and relationship to traditional Chinese cultural values. Offered: jointly with ARCH 451.

ART H 412 Chinese Painting in the Twentieth Century (3) VLPA Modern Chinese painting and art theories, seen in relation to China's twentieth-century struggles over nationalism and Westernization, traditionalism and modernization, individualism and the Maoist "mass line."

ART H 413 Selected Topics in Chinese Art (3, max. 9) VLPA Specific theme or area of Chinese art, such as the art of bronze age China or Chinese painting under Communist rule.

ART H 414 Early Chinese Painting: Neolithic Period to Five Dynasties (3) VLPA/I&S Emergence and development of Chinese painting, its styles, esthetic theories, and cultural content, from earliest times through the tenth century AD.

ART H 415 Chinese Painting: The Sung Period (3) VLPA/I&S Golden age of Chinese painting, emphasizing the monumental, romantic, and Zen Buddhist landscape painting traditions of the tenth through thirteenth centuries.

ART H 416 Chinese Painting: The Yuan Period (3) VLPA/I&S Chinese painting under Mongol rule, in the fourteenth century: a period of political and social crisis that gave rise to a revolution in painting styles.

ART H 417 Later Chinese Painting: Ming, Ch'ing, and Modern Periods (3) VLPA/I&S Major masters and traditions, esthetic attitudes, and social role of Chinese painting from the fifteenth century to the present day.

ART H 418 Political Aspects of Chinese Painting (3) VLPA Examination of the close link between painting and politics in China, focusing on such aspects as imperial patronage and propaganda, paintings by Chinese courtiers and the arts of political protest and lament, Chinese painting under Communist rule.

ART H 419 Japanese Architecture (3) VLPA Survey of Japanese architecture from its origins to modern times. Although Shinto architecture, tea houses, gardens, and modern developments are discussed, the primary focus is on the development of Japanese Buddhist architecture. Offered: jointly with ARCH 453.

ART H 420 Art of the Japanese Print (3) VLPA Foundations of Ukiyo-e in Japanese genre from the twelfth through mid-seventeenth centuries; woodblock technique from the Heian period through the early Edo period. Emphasis on the changing styles and subject matter in Ukiyo-e Hanga from Moronobu through Kuniyoshi.

ART H 421 Early Japanese Painting (3) VLPA Survey of the development of Japanese painting from the earliest times to the end of the Muromachi period in 1567. The Shinto, Buddhist, Yamato-e, and Tosa schools of painting are discussed prior to an overview of Muromachi suibokuga painting.

ART H 422 The Kan-ga Tradition (3) VLPA Ink paintings of Japanese Zen priests from the fourteenth century onward, and the works of professional artists belonging to those families (Kano, Hasegawa, Unkoku, and Kaiho) in which Chinese academic painting has been the principal inspiration, from the sixteenth century to the present.

ART H 423 Later Japanese Painting (3) VLPA Survey of the development of Japanese painting from the Momoyama period to the present (1568 on). The relation of the traditional schools of painting concludes with the development of modern Japanese and Western styles in the twentieth century.

ART H 424 The Nanga Tradition (3) VLPA Works of painting and calligraphy by Japanese artists who have been part of the Chinese scholar-painting tradition from the late seventeenth century to the present.

ART H 425 Modern Japanese Painting (3) VLPA Painting of the Meiji, Taisho, and Showa eras (1868 to the present) by artists working in the modern idiom of either Yoga or Nihonga.

ART H 426 Japanese Sculpture (3) VLPA Survey of Japanese sculpture from prehistory to modern times. Although the main theme is Buddhist sculpture, Shinto sculpture, folk sculpture, and modern trends are also introduced. Examines style, religious meaning, construction techniques, and placement within architectural settings.

ART H 427 Japanese Ceramics (3) VLPA Discusses Japanese ceramics from prehistory to the twentieth century with regard to manufacturing process and differing sense of design. Relation of form to use also considered, especially in connection with tea ceramics.

ART H 428 East Asian Calligraphy (3, max. 9) VLPA Classical calligraphy tradition of China and Japan in history and practice. Prerequisite: permission of undergraduate adviser.

ART H 429 Japanese Cinema (3) VLPA Eleven masterpieces of Japanese cinema, studied in the context of what they reveal about Japanese culture and the art of the film.

ART H 431 Pre-Columbian Art (3) VLPA Arts of pre-Columbian cultures of Central and South America from prehistoric times to European contact.

ART H 432 Oceanic Art (3) VLPA/I&S Arts of Oceania, studied through cultures of Polynesia, Micronesia, Melanesia, and Australia.

ART H 433 Northern Northwest Coast Native American Art: Methodologies in Stylistic Analysis (3) VLPA Stylistic and historical analysis of northern Northwest Coast art (Haida, Tlingit, Tsimshian, Northern Wakashan). Intensive analysis of formline rules;

stylistic variation through time and between tribal and individual artists' styles.

ART H 434 Native American Art and Ceremony of the Southern and Central Northwest Coast (3) VLPA/I&S Examination of the role of the visual arts in the ceremonial life of the Native American people of the central and southern Northwest Coast. Emphasis on the traditional social and religious aspects of ceremonialism, contrasts between tribal traditions, and continuing twentieth-century traditions.

ART H 435 Thematic Studies in Native American Art (3, max. 9) VLPA/I&S Wright Approach to Native American art through themes and issues. Focus varies from year to year (e.g. Shamanism in Native American art, gender identity in Native American art, social and political aspects of Native American art, issues in contemporary Native American art).

ART H 436 Arts of Sub-Saharan Africa I (3) VLPA/I&S Traditional arts of the Western Sudan and the Western Guinea coast with their archaeological antecedents.

ART H 437 Arts of Sub-Saharan Africa II (3) VLPA/I&S Traditional arts of the Central Guinea coast, Nigeria, Cameroon, and Gabon, from precontact times to the present.

ART H 438 Arts of Sub-Saharan Africa III (3) VLPA/I&S Arts of Zaire, Angola, the Swahili coast, and southern Africa.

ART H 442 Greek and Roman Painting (3) VLPA Painted decoration on Greek vases, and Roman wall painting, with emphasis on the historic and stylistic development of each. Offered: jointly with CL AR 442.

ART H 444 Greek and Roman Sculpture (3) VLPA History and development of Greek sculpture and sculptors, their Roman copyists, and Roman portraits and sarcophagi. Emphasis on Greek sculpture of the fifth century BC. Offered: jointly with CL AR 444.

ART H 446 Greek Architecture (3) VLPA Detailed study of Greek architecture from its beginnings, with special emphasis on the Periclean building program in fifth-century Athens. Offered: jointly with CL AR 446/ARCH 454.

ART H 448 The Archaeology of Italy (3) VLPA Harmon Study of the principal archaeological sites in Italy with special emphasis on ancient Rome. Sites include the Alban hills, Ostia, Pompeii, Herculaneum, Tarquinia, Paestum, Tivoli, and Praeneste. Attention given to the relationship between material remains and their purpose in ancient life. Illustrated by slides. Offered: jointly with CL AR 448.

ART H 451 Topics in Early Christian and Byzantine Art and Architecture (3, max. 9) VLPA Specific theme or area of early Christian and Byzantine art and architecture, such as early Christian and Byzantine mosaics or the art of Constantinople.

ART H 452 Art, Religion, and Politics in the Early Christian Period, 300-700 AD (3) VLPA/I&S Kartsonis Evolution of the art of the early Christian period (300-700 AD) in the context of contemporary religious, political, and cultural developments. Offered: jointly with RELIG 442.

ART H 453 Art, Religion, and Politics in Byzantium, 700-1453 AD (3) VLPA/I&S Kartsonis Evolution of the art of Byzantium (700-1453 AD) in the context of contemporary religious, political, and cultural developments. Offered: jointly with RELIG 443.

ART H 454 Romanesque Art (3) VLPA Western European art in the eleventh and twelfth centuries, focusing on monuments along the pilgrimage roads to Compostela in France and Spain.

ART H 455 Special Studies in Gothic Art and Architecture (3) VLPA Detailed study of Gothic architecture and its accompanying sculpture and stained

glass, with special emphasis on the twelfth and thirteenth centuries in France and England. Offered: jointly with ARCH 455.

ART H 456 Art of the Medieval West: Carolingian and Ottonian Art, 750-1050 AD (3) VLPA Kartsonis Examines the development of the arts during the Carolingian and Ottonian periods in the Medieval West.

ART H 461 Early Renaissance Painting in Italy (3) VLPA Painting of the fourteenth and fifteenth centuries in central and northern Italy.

ART H 462 High Renaissance Painting in Italy (3) VLPA Painting in central and northern Italy, from about 1480 to about 1530: Leonardo, Raphael, the early Michelangelo, Sarto, Correggio, Bellini, Giorgione, and the early Titian.

ART H 463 Italian Renaissance Sculpture (3) VLPA From Nicola Pisano to Giambologna.

ART H 464 Late Renaissance Painting in Italy (3) VLPA Painting in central and northern Italy, from about 1515 to about 1580: Pontormo, Rosso, Parmigianino, Beccafumi, the later Michelangelo, Vasari, Bronzino, Salviati, the later Titian, Tintoretto, and Veronese.

ART H 465 Italian Renaissance Architecture (3) VLPA From the cathedral of Florence to St. Peter's in Rome: the style, symbolism, and theory of architecture.

ART H 466 High Renaissance Painting in Venice (3) VLPA Painting in Venice, circa 1480 to circa 1580: Bellini, Carpaccio, Giorgione, Titian, Lotto, del Piombo, Tintoretto, and Veronese.

ART H 470 English Art: 1500-1800 (3) VLPA English art, principally painting, and, to a lesser extent, architecture. Emphasis on patronage, on the conditions that produced the decided peculiarities of English art, and on the final triumph of the native tradition.

ART H 471 Rome in the Seventeenth Century (3) VLPA Painting, sculpture, and architecture; concentration on Caravaggio, Bernini, Poussin, and Borromini.

ART H 481 Romanticism (3) VLPA Romantic tendencies of the late eighteenth and early nineteenth centuries, with emphasis on stylistic and iconographic study of painting in Spain, England, Germany, France, and the United States to about 1830.

ART H 482 Realism and Impressionism (3) VLPA Art and the world, 1830-80: high Romanticism through Realism and Impressionism, with emphasis on painting in France.

ART H 483 Post-Impressionism to 1918 (3) VLPA Post-Impressionism and the great revolution of early twentieth-century art, with emphasis on painting. From the first revisions of Impressionism around 1880 to Fauvism, Cubism, Futurism, the Blaue Reiter, and Dadaism.

ART H 484 Topics in Modern Art (3, max. 9) VLPA Approach to art of the nineteenth and twentieth centuries through particular themes, genres, contexts, or other issues. Focus varies from year to year.

ART H 485 Italian Futurism, Dada, Surrealism (5) VLPA Failing Survey of three European early modern art movements whose ultimate objective was the collapse of bourgeois culture. Central issues: the role of art and artists in catalyzing social change, strategies for destroying public faith in logic, integration of verbal and visual signs and nonaesthetic conceptions of art.

ART H 486 Abstract Expressionism: History and Myth (3) VLPA Thematic and chronological survey of abstract expressionism, including major genres of critical interpretation, social and art-historical context, and revisionist scholarship. Recommended: 381.

ART H 488 American Architecture (3) VLPA American architecture from indigenous native American traditions to the present. Prerequisite: some back-

ground in architectural history. Offered: jointly with ARCH 488.

ART H 490 Nineteenth-Century Architecture (3) VLPA From late eighteenth-century French rationalists, Neoclassicists, to fin de siècle Vienna and Paris. Includes theorists such as Ruskin, Viollet-le-Duc, and Semper; major movements, such as the Arts & Crafts, and the French Ecole des Beaux-Arts method of design. Prerequisite: some background in architectural history. Offered jointly with ARCH 456.

ART H 491 Twentieth-Century Architecture (3) VLPA Architecture in the twentieth-century, mainly in Europe and the United States. Traces roots of Modernism in Europe in the 1920's, its demise (largely in the United States) in the 1960's and recent trends such as Post-Modernism and Deconstructivism. Prerequisite: some background in architectural history. Offered jointly with ARCH 457.

ART H 493 Architecture Since 1945 (3) VLPA Theories and forms in architecture from the end of World War II to present. Includes new wave Japanese architects, recent Native American developments, and non-Western as well as Western trends. Prerequisite: some background in architectural history. Offered: jointly with ARCH 459.

ART H 496 Art and Sexual Imagery (3) VLPA Themes and symbols of sexuality in art in a range of world cultures and time periods investigated through readings that illumine the contextual meaning of the works. Religious, political, psychological, and economic interpretations employed to understand the widespread existence and importance of these topics.

ART H 498 Individual Projects, Undergraduate Practicum (2-5, max. 10) Fieldwork or internships in art-related areas in the community. Practical experience in areas such as arts administration, gallery and museum operations, collection cataloging, curatorial responsibilities, and art education. Credit/no credit only. Prerequisite: permission of departmental undergraduate adviser.

ART H 499 Individual Projects (2-5, max. 10) Prerequisite: permission of undergraduate adviser.

Courses for Graduates Only

Most 500-level courses are specialized seminars oriented to new research, intended for graduate students in art history, but open to others who possess the necessary qualifications. Since specific content varies, all students must obtain the permission of the instructor or the art history graduate coordinator.

ART H 500 Methods of Art History (5) Introduction to the specialized bibliography of art historical research and to the wide variety of approaches to art historical problems of all periods and regions.

ART H 501 Seminar in the General Field of Art (5, max. 15)

ART H 509 Seminar in Special Topics in Art History (5, max. 15) Specific focus changes from quarter to quarter.

ART H 511 Seminar in Chinese Art (5, max. 15) Critical appraisal of the principal research methods, theories, and types of literature dealing with the art of China.

ART H 515 Seminar in Japanese Art (5, max. 15) Critical appraisal of the principal research methods, theories, and types of literature dealing with the art of Japan.

ART H 531 Seminar in Tribal Art (5, max. 15) Methodological and cross-disciplinary problems in the visual arts of precolonial Africa, Oceania, and America. Specific content varies.

ART H 533 Seminar in North American Indian Art (5, max. 15) Problems in North American Indian visual arts. Content varies.

ART H 541 Seminar in Greek and Roman Art (5) Langdon In-depth study of selected topics and problems of the art of ancient Greece and Rome. Offered: jointly with CL AR 541.

ART H 551 Seminar in Early Christian, Byzantine, and/or Medieval Art and Architecture (5, max. 15) Problems in early Christian, Byzantine, and medieval art and architecture. Content varies. Prerequisite: permission of instructor.

ART H 561 Seminar in Italian Renaissance Art (5, max. 15) Problems and in-depth study of selected topics of the art of the Italian Renaissance.

ART H 565 Seminar in Museum Studies (5, max. 10) Using the fourteenth- to twentieth-century paintings at the Seattle Art Museum, student learn to look at paintings as physical objects, considering working methods and changing techniques and the impact of time and intervention on the way we see them today. Prerequisite: permission of instructor.

ART H 568 Seminar in North European Art (5, max. 15) Deals with problems of style and iconography of the northern European masters of the fourteenth through seventeenth centuries.

ART H 577 Seminar in Baroque Art (5, max. 15) Iconographic and stylistic problems of the art of the Baroque period, with emphasis on the principal research methods, theories, and types of literature dealing with the art of the seventeenth and eighteenth centuries in Europe.

ART H 581 Seminar in Modern Art (5, max. 15) Art historical problems of the nineteenth and twentieth centuries.

ART H 590 Seminar in Criticism of Contemporary Art (5, max. 15) Contemporary art and appropriate critical methodology.

ART H 591 Seminar in Twentieth-Century Architecture (3/5) Specific focus changes from quarter to quarter. Prerequisites: graduate standing with background in art history, architecture, architectural history, or permission of instructor. Offered: jointly with ARCH 558.

ART H 592 Seminar in American Architecture (5) Clausen Topics vary. Offered: jointly with ARCH 529.

ART H 598 Master's Practicum (* max. 15) Credit/no credit only.

ART H 599 Reading and Writing Projects (2) Art historical issues, methods, and materials. Required of all graduate majors registered in 400-level art history courses. Open also to graduate nonmajors.

ART H 600 Independent Study or Research (*)

ART H 700 Master's Thesis (*) Credit/no credit only.

ART H 800 Doctoral Dissertation (*) Credit/no credit only.

Asian American Studies

See American Ethnic Studies.

Asian Languages and Literature

223 Gowen

The Department of Asian Languages and Literature offers instruction in the principal languages and literatures of Asia, including East, Southeast, Central, and South Asia. Emphasis is placed on the roles of these languages within the cultures they serve as well as on linguistic, textual, and literary analysis. Courses on Asian literature in English are offered for majors and nonmajors alike.

Undergraduate Program

Adviser
Lauren J. Hussey
225 Gowen

Bachelor of Arts

Admission Requirements: Minimum 20 credits college-level course work or department-approved equivalent in intended primary language of concentration. The most recent course taken in the primary language must be completed at the UW with a grade of 2.5 or higher. Completion of one writing (W-prefix) course taught in English with a grade of 2.0 or higher. Admission is possible with a cumulative GPA of 2.00, but the department strongly recommends that prospective majors present a cumulative GPA of 2.50 or higher. Applicants may submit materials in addition to transcripts clarifying any aspect of past course work. Denied applicants may appeal.

Major Requirements

Chinese: 55 credits in the language, 10 beyond third-year level, including CHIN 451; 10 credits in Chinese literature, excluding 499; 3 credits in Chinese linguistics; 5 credits in area-related humanities or social science courses.

Japanese: 45 credits in the language, 15 beyond second-year level; 30 credits in area-related humanities or social science courses at the 300 level or above, including a designated sequence in either Japanese literature or linguistics.

Korean: 45 credits in the language, 15 beyond second-year level; 30 credits in literature and area-related humanities or social science courses.

South Asian languages: 60 credits in languages, of which 45 are in the major language, 15 in the minor language; 15 credits in area-related humanities or social science courses to be chosen in consultation with adviser, including HSTAS 201 and ASIAN 401. If Tibetan is the major language: 42 major language credits, 15 minor language credits; 18 credits in area-related humanities or social science courses to be chosen in consultation with adviser, including HSTAS 201 and ASIAN 401.

Thai: 45 credits in the language, 15 beyond second-year level; 20 credits in area-related humanities or social science courses to be chosen in consultation with adviser.

Minors

Minor Requirements

Chinese: 30 credits to include minimum 15 language credits from the following: CHIN 311, 312, 313; 411, 412, 413; 451, 452, 453; 470, 482. 15 credits in area-related humanities courses from the following: ASIAN 201, 204, 263 (when topic is China), CHIN 293, 342, 373, 374, 380, 381, 461, 462, 463, 482. (CHIN 482 may count as language or area-related humanities credit, but not both.)

Hindi: 30 credits to include 15 language credits at the second-year level (HINDI 321, 322, 323) or above. 15 credits in area-related humanities courses to include either ASIAN 203 or 206 and any of the following: ART H 306; HSTAS 201, 202, 401, 402, 403, 404; PHIL 386, 412; RELIG 352, 354.

Japanese: 30 credits to include 15 language credits at the third-year level (JAPAN 311, 312, 313) or above. 15 credits in additional language or literature/culture courses. Acceptable courses include, but are not limited to: JAPAN 321, 322, 323, 431; 432, 433, 440, 471, 472, 473; ART H 316, 317; ART 321; ECON 494; GEOG 313, 437; HSTAS 421, 422, 423; MUSIC 494, 495; POL S 435; SISEA 440, 441, 442, 451, 473, 475, 476, 478. Acceptable language courses include those offered by the Technical Japanese program, the Jackson School of International Studies, the School of Law, and the School of Business Administration. At least half of the credits for the minor must be taken at the UW.

Sanskrit: 30 credits to include 15 language credits at the second-year level (SNKRT 401, 402, 403) or above. 15 credits in area-related humanities courses to include either ASIAN 203 or 206 and any of the following: ART H 306; HSTAS 201, 202, 401, 402, 403, 404; PHIL 386, 412; RELIG 352, 354.

Tibetan: 30 credits to include 18 language credits (TIB 311, 312, 313, 411, 412, 413). 12 credits in area-related humanities courses to include RELIG 354 and either RELIG 450 or 452 and any of the following: ASIAN 203; HSTAS 201, 211, 401, 431; PHIL 418.

Graduate Program

William G. Boltz, Graduate Program Coordinator

The Department of Asian Languages and Literature offers programs of study leading to the Master of Arts and Doctor of Philosophy degrees with specializations in a) the languages and literatures of China, subsuming Chinese, Manchu, Mongolian, and Tibetan (in the context of the close linguistic and historical links between China and Tibet); b) the language and literature of Japan; c) the languages and literatures of South Asia, subsuming Sanskrit, Hindi, Tamil, and Tibetan (here in the context of Tibet's close cultural affinity with South Asia). All graduate students in the department must affiliate themselves with one of these three programs. The department does not offer degrees or specializations in language pedagogy.

Financial aid for graduate students newly entering the department is very limited and is awarded on a competitive basis. Since some financial aid is wholly or partially determined by need, all prospective students are urged to submit the Free Application for Federal Student Aid (FAFSA) with the College Scholarship Service in New Jersey, and to apply for other forms of aid mentioned in the department's cover letter to prospective students.

A full range of courses in other disciplines and aspects of Asian cultures and civilizations is available from other departments and schools of the University, such as the Departments of Anthropology, History, Linguistics, Comparative Literature, and Political Science, and the Henry M. Jackson School of International Studies. Students in the Department of Asian Languages and Literature are encouraged to avail themselves of these offerings to complement and supplement their language and literature studies.

Admission Requirements

Applicants for admission should present an undergraduate major in the language and literature of specialization (three years of language training for admission to the Chinese and Japanese programs; fewer years of language acquisition may be acceptable in South Asian languages), or the background and training equivalent to such a major. Students without such a background may be qualified for admission, but will

need to acquire the program prerequisites during the earliest stages of their graduate study.

Besides an application and one original set of transcripts of prior postsecondary education (a second original set of which should be sent directly to the Office of Graduate Admissions), the department requires a statement of academic goals, and three letters of recommendation addressed to the Graduate Program Coordinator.

Degree Requirements

The research component of the Master of Arts degree may be satisfied by the writing of either a thesis or two research papers. The Doctor of Philosophy degree requires a dissertation. In addition to the language of specialization, reading knowledge of a second (usually Western) language is required for the Master of Arts degree, and of a third (usually Asian) language for the Doctor of Philosophy degree. Neither English nor, usually, the student's native language may be used to fulfill these additional requirements.

Correspondence and Information

Graduate Program Coordinator
225 Gowen, Box 353521

Faculty

Chair

Michael Shapiro

Professors

Cirtautas, Ilse D. * 1968, (Adjunct); PhD, 1958, University of Hamburg (Germany); Turkic languages and literatures.

Gething, Thomas W. 1995, (Affiliate); PhD, 1966, University of Michigan, Thai and Lao language and linguistics.

Knechtges, David R. * 1972; PhD, 1968, University of Washington; Han and Six Dynasties literature.

Norman, Jerry * 1971; PhD, 1969, University of California (Berkeley); Chinese language and linguistics, Altaic linguistics.

Potter, Karl H. * 1970, (Adjunct); PhD, 1955, Harvard University; South Asia, Indian philosophy, epistemology.

Salomon, Richard G. * 1981; PhD, 1975, University of Pennsylvania; Sanskrit language and literature.

Schiffman, Harold F. * 1967, (Affiliate); PhD, 1969, University of Chicago; Dravidian language and literature, sociolinguistics, Tamil, language policy.

Serruys, Paul L. M. 1965, (Emeritus); PhD, 1956, University of California (Berkeley); classical Chinese.

Shapiro, Michael * 1970; PhD, 1973, University of Chicago; Indo-Aryan languages and linguistics.

Shih, Vincent Y. 1945, (Emeritus); MA, 1930, Yenching (China); PhD, 1939, University of Southern California; Chinese.

Treat, John W. * 1983; PhD, 1982, Yale University; Japanese language and literature.

Wang, Ching-Hsien * 1971; PhD, 1971, University of California (Berkeley); Chinese poetry and comparative literature.

Yue-Hashimoto, Anne O. * 1981; PhD, 1966, Ohio State University; Chinese language, linguistics and dialectology.

Associate Professors

Boltz, William * 1981; PhD, 1974, University of California (Berkeley); classical Chinese.

Brandauer, Frederick P. * 1973; PhD, 1973, Stanford University; traditional Chinese vernacular fiction and modern Chinese literature.

Cooke, Joseph R. * 1967, (Emeritus); PhD, 1965, University of California (Berkeley); Thai language and literature.

Cox, Collett D. * 1985; PhD, 1983, Columbia University; Buddhist studies (East and South Asian), Indian philosophy and religion, comparative religion.

Kano, Tamako-Niwa * 1962, (Emeritus); PhD, 1958, Radcliffe; Japanese language.

Lukoff, Fred 1964, (Emeritus); MA, 1948, PhD, 1954, University of Pennsylvania; Korean language and linguistics.

Tsutsui, Michio * 1990, (Adjunct); PhD, 1984, University of Illinois; technical Japanese, international technical communication, linguistics, computer-aided instruction.

Assistant Professors

Kobayashi, Motoo 1994; MA, 1988, PhD, 1994, University of Washington; modern and contemporary Japanese literature, comparative literature.

Ohta, Amy 1995; MA, 1990, PhD, 1993, University of California (Los Angeles); applied linguistics, acquisition of Japanese as a second language, sociolinguistics.

Ohta, Kaoru 1995; MA, 1987, PhD, 1994, University of California (Los Angeles); Japanese linguistics, syntax, morphology.

Senior Lecturers

Hsie, Huang-Yi 1973; BS, 1953, National Taiwan University; Chinese language.

Nguyen, Kim O. 1984; PhD, 1973, University of California (Los Angeles); Vietnamese language and literature.

Norman, Stella Chen 1984; MA, 1957, National Taiwan University; Chinese language.

Lecturers

Budiman, Achmad 1992; BA, 1991, University of Brawijaya (Indonesia); Indonesian language and literature.

Hasegawa, Mitsuko 1987; MAT, 1979, Augustana College; Japanese language.

Hines, Naseem A. 1981; MA, 1983, University of Washington; Hindi and Urdu language and literature.

Kesavatana-Dohrs, Wiworn 1989; PhD, 1989, University of Michigan; Thai language and literature.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

Altaic

ALTAI 401, 402, 403 Written Mongolian (3, 3, 3) Norman Introduction to Mongolian written in the vertical script. Texts of different periods and genres. Prerequisite: permission of instructor. Offered: alternate years; A, W, Sp.

ALTAI 405, 406, 407 Manchu (3, 3, 3) Norman Introduction to Manchu, with principal focus on the structure of the language. Reading of texts of different genres. Prerequisite: permission of instructor. Offered: alternate years; A, W, Sp.

ALTAI 415, 416, 417 Spoken Mongolian (5, 5, 5) Norman Introduction to the modern spoken language of Mongolia. Emphasis on correct pronunciation and oral skills. Offered: A, W, Sp.

Asian Languages and Literature

ASIAN 201 Literature and Culture of Ancient and Classical China (5) VLP/MS Knechtges Intro-

duction to ancient and classical Chinese literature in its cultural context. Texts in English translation. Offered: alternate years; A.

ASIAN 202 Literature and Culture of Traditional Japan (5) VLPA/I&S *Treat* Introduction to traditional Japanese literature in its cultural context. Texts in English translation. Offered: alternate years; W.

ASIAN 203 Literature and Culture of Ancient and Classical India (5) VLPA/I&S *Salomon, Shapiro* Introduction to ancient and classical India literature in its cultural context. Texts in English translation. Offered: alternate years; Sp.

ASIAN 204 Literature and Culture of China from Tradition to Modernity (5) VLPA/I&S *Brandauer* Introduction to modern Chinese literature in its cultural context. Texts in English translation. Offered: alternate years; A.

ASIAN 205 Literature and Culture of Japan from Tradition to Modernity (5) VLPA/I&S *Treat* Introduction to Japanese literature of the nineteenth and twentieth centuries in its cultural context. May also include some Korean literature. Texts in English translation. Offered: alternate years; W.

ASIAN 206 Literature and Culture of South Asia from Tradition to Modernity (5) VLPA/I&S *Shapiro* Introduction to medieval and modern South Asian literature in its cultural context. Texts in English translation. Offered: alternate years; Sp.

ASIAN 207 Special Topics in Literature and Culture of Asia (5) VLPA/I&S Introduction to the literature of one or more Asian traditions considered in its cultural context. Content varies depending on the specialization and interest of instructor. Texts in English translation. Offered: W.

ASIAN 401 Introduction to Asian Linguistics (5) VLPA *K Ohta, Shapiro* Linguistic analysis, with emphasis on languages of east, southeast, south, and central Asia. Includes phonetics, phonemics, morphology, syntax, historical reconstruction, linguistic typology, comparative grammar. Survey of major languages and language families of Asia. Diverse Asian languages as subjects of linguistic analysis. Prior knowledge of linguistics not required. Prerequisite: two years of one Asian language or permission of instructor. Offered: A.

ASIAN 404 Writing Systems (3) VLPA *Boltz, Salomon* Origin, nature, and development of writing systems. Alphabets, syllabaries, and logographic systems; relation of writing systems to spoken languages; decipherment of previously undeciphered scripts. Prerequisite: 401 or equivalent or permission of instructor. Offered: alternate years.

ASIAN 405 Advanced Problems in Asian Linguistics (3) VLPA *K Ohta, Shapiro* Advanced problems in the analysis of the languages of east, southeast, south, and central Asia. Includes phonology, morphology, syntax, lexicography, historical reconstruction, linguistic typology, and comparative grammar. Prerequisite: 401 or equivalent or permission of instructor. Offered: alternate years.

ASIAN 498 Special Topics (1-5, max. 15) VLPA Offered occasionally by permanent or visiting faculty members. Topics vary. Offered: AWSp.

Chinese

CHIN 111, 112, 113 First-Year Chinese (5, 5, 5) S *Norman* Introduction to the standard language. Emphasis on learning correct pronunciation and basic structure. Drill in oral use of the language. Cannot be taken for credit in combination with 134. Offered: A, W, Sp.

CHIN 121 Accelerated Chinese (10) S *Norman* Covers same material as 111 and 112. In conjunction with 222 and 223, allows completion of two years' language study in one academic year. Cannot be

taken for credit in combination with 111 or 112. Offered: A.

CHIN 134 First-Year Intensive Chinese (15) Equivalent of 111, 112, 113. Introduction to the standard language; correct pronunciation and basic structure; drill in oral use of the language. Especially recommended for students (particularly graduate students) who plan to devote more time to other subjects during the regular academic year. Cannot be taken for credit in combination with 111, 112, or 113. Offered: S.

CHIN 211, 212, 213 Second-Year Chinese (5, 5, 5) VLPA *Hsia* Continuation of 111, 112, 113. Advanced grammar and vocabulary expansion stressed. Oral practice and structural drills continued. Cannot be taken for credit in combination with 234. Prerequisite: 113 or equivalent. Offered: A, W, Sp.

CHIN 222 Accelerated Chinese (10) VLPA *S Norman* Covers same material as 113 and 211. In conjunction with 121 and 223, allows completion of two years' language study in one academic year. Cannot be taken for credit in combination with 113 or 211. Prerequisite: 121 or equivalent. Offered: W.

CHIN 223 Accelerated Chinese (10) VLPA *S Norman* Covers same material as 212 and 213. In conjunction with 121 and 222, allows completion of two years' language study in one academic year. Cannot be taken for credit in combination with 212 or 213. Prerequisite: 222 or equivalent. Offered: Sp.

CHIN 234 Second-Year Intensive Chinese (15) VLPA Equivalent of 211, 212, 213. Cannot be taken for credit in combination with 211, 212, or 213 taken. Prerequisite: 113 or equivalent. Offered: S.

CHIN 311, 312, 313 Third-Year Chinese (5, 5, 5) VLPA *Hsieh* Concentrated practice in the use of Chinese as spoken in everyday life. Listening comprehension and speaking skills emphasized. Readings selected to broaden the student's understanding of modern Chinese culture and to spark discussion of contemporary issues. Cannot be taken for credit in combination with 334. Prerequisite: 213 or permission of instructor. Offered: A, W, Sp.

CHIN 333 Intensive Business Chinese (15) VLPA Introduction to oral Chinese as employed in business contexts, illustrates the level of language common to a wide range of Sino-American business communication situations and to general situations in international trade. Prerequisite: 213 or equivalent.

CHIN 334 Third-Year Intensive Chinese (15) VLPA Equivalent of 311, 312, 313. Reading of unedited texts—newspaper articles, essays, short stories. Oral practice and structural drill. Cannot be taken for credit in combination with 311, 312, or 313. Prerequisites: 213 or equivalent and permission of instructor.

CHIN 342 The Chinese Language (3) VLPA *Norman, Yue-Hashimoto* Nature and structure of the Chinese language, covering structural characteristics, genetic and typological affinity with other groups, sound system of standard Mandarin, Chinese writing system and language reforms, brief survey of the history of the Chinese language, and aspects of language in relation to culture. Prerequisite: 213 or equivalent. Offered: A.

CHIN 344 Intensive Chinese in Beijing (15) VLPA *Beijing University Teaching Staff* Eight weeks of intensive instruction in modern Chinese, including readings in modern Chinese texts, oral conversation drill, introduction to past and present Chinese culture, and weekly lectures on such topics as Chinese literature, art, economics, politics, and history. Informal visits with artists, writers, and scholars; weekend excursions to cultural and historic sites in and around Beijing; and a final two-week study tour of selected cities of north and east China. Prerequisite: permission of department.

CHIN 345 Spoken Chinese in Beijing (6, max. 18) VLPA *Beijing University Teaching Staff* Designed

to increase active vocabulary, to enhance the student's understanding of Chinese grammar, to further the student's control of idiomatic Chinese, and, in general, to develop oral skills. Prerequisite: 313 or 344.

CHIN 346 Chinese Readings in Beijing (6, max. 18) VLPA *Beijing University Teaching Staff* General readings in textbooks prepared by Beijing University and selected readings in modern or traditional vernacular literature or in the social sciences. Prerequisite: 313 or 344.

CHIN 374 Chinese Prose (5) VLPA *Knechtges* Offered: see under "Courses in English".

CHIN 411, 412, 413 Fourth-Year Chinese (5, 5, 5) VLPA *Yue-Hashimoto* Reading of unedited texts including newspaper articles, literary selections, and academic essays. Oral discussion, listening comprehension, and composition. Prerequisites: 313 or equivalent for 411; 411 or equivalent for 412; 412 or equivalent for 413. Offered: A, W, Sp.

CHIN 443 Structure of Chinese (5) VLPA *Yue-Hashimoto* Outline of the major syntactic structures of Chinese. Focus on learning and teaching problems. Prerequisite: 313 or equivalent. Offered: W.

CHIN 451, 452, 453 First-Year Classical Chinese (5, 5, 5) VLPA *Boltz* Exercises and selected readings in pre-Han texts. Focus on grammar, systematic sentence analysis, and distinctive functions of grammatical particles. To be taken in sequence. Prerequisite: 213 or equivalent for 451; 451 for 452; 452 for 453. Offered: A, W, Sp.

CHIN 461, 462, 463 History of Chinese Literature (5, 5, 5) VLPA *Brandauer, Knechtges* 461-Chinese literature from earliest times to the end of the Six Dynasties; 462-Chinese literature from the T'ang to the end of the Song; 463-Chinese literature from the Yuan to recent times. Prerequisite: 453 or equivalent. Offered: A, W, Sp.

CHIN 470 Advanced Readings in Modern Chinese (5) VLPA *Norman* Reading and translation of scholarly articles and selections in the humanities and social sciences. Prerequisite: 414 or permission of instructor. Offered: A.

CHIN 482 Advanced Readings in Modern Chinese (5) VLPA *Brandauer* Modern texts in the original, mainly works published since the beginning of the twentieth century. Focus on literature, primarily short story and essay. Offered: W.

CHIN 496 Special Studies in Chinese (5, max. 15) VLPA Topics vary.

CHIN 499 Undergraduate Research (3-5, max. 15) For Chinese language and literature majors. Prerequisite: permission of instructor and undergraduate adviser. Offered: AWSpS.

Hindi

HINDI 311, 312, 313 Elementary Hindi (5, 5, 5) *Hines, Shapiro* Modern literary Hindi. Reading, writing, and conversation. Introduction to Devanagari script. Offered: A, W, Sp.

HINDI 321, 322, 323 Intermediate Hindi (5, 5, 5) VLPA *Hines, Shapiro* Systematic expansion of vocabulary and grammar. Intermediate-level prose and poetry readings. Oral drills. Prerequisite: 313 or equivalent. Offered: AS, WS, SpS.

HINDI 401, 402, 403 Advanced Hindi (5, 5, 5) VLPA *Hines, Shapiro* Rapid reading of contemporary Hindi prose, poetry, and drama. Advanced conversation and composition. Prerequisite: 323 or equivalent. Offered: A, W, Sp.

HINDI 404 Derivational Morphology of Hindi/Urdu (3) VLPA *Shapiro* A systematic introduction to the derivational morphology of Hindi/Urdu. Sanskrit, Persian, Arabic, and English elements in Hindi/Urdu. Treatment of derivational prefixes and suffixes, stem

alternations, and methods of compound formation. Prerequisite: 403 or equivalent, or permission of instructor. Offered: alternate years; W.

HINDI 421, 422, 423 Survey of Modern Hindi Literature (3, 3, 3) VLPA *Hines, Shapiro* Survey of Hindi literature from the late nineteenth century to the present. Readings from representative short stories (421), poems (422), and novels (423). Prerequisites: 403 or equivalent for 421; 421 or equivalent for 422; 422 or equivalent for 423.

HINDI 431 Advanced Conversational Hindi (2, max. 8) VLPA Conversational practice in contemporary Hindi. Prerequisite: 323 or equivalent or permission of instructor. Offered: Sp.

HINDI 451 Advanced Hindi Readings (3, max. 9) VLPA Readings in Modern Standard Hindi prose texts drawn from diverse disciplines. Prerequisite: 403 or equivalent. Offered: W.

HINDI 499 Undergraduate Research (3-5, max. 15) Primarily for Hindi language and literature majors. Prerequisite: permission of instructor and undergraduate adviser. Offered: AWSpS.

Indian

INDN 400 Practicum in South Asian Languages (3, max. 18) VLPA Introduction to any one of various South Asian languages (e.g., Kannada, Nepali, Punjabi, Sinhala, Marathi, Telugu, Urdu) not taught on a regular basis. Students may receive credit for more than one such language. Prerequisite: permission of instructor.

INDN 401, 402 Pali (3, 3) VLPA *Cox* Introduction to Pali language and literature. Prerequisite: SNKRT 403 or equivalent or permission of instructor.

INDN 403 Introduction to Written Urdu (3) VLPA *Hines* Modern written Urdu for students with at least elementary knowledge of Hindi. Prerequisite: HINDI 313 or equivalent. Offered: A.

INDN 404 Readings in Urdu Literature (3, max. 18) VLPA *Hines* Readings in Urdu prose and poetry. Urdu prose composition. Prerequisite: 403 or equivalent. Offered: AWSp.

INDN 410 Prakrit (3, max. 6) VLPA *Salomon* Introduction to the various Prakrit or Middle Indo-Aryan dialects (Gandhari, Magadhi, Maharashtri, Sauraseni) from literary, canonical, and inscriptional sources. Prerequisite: SNKRT 303 or equivalent

INDN 411 First-Year Intensive Bengali (15) C *Salomon* Study of modern Standard Bengali, including reading, writing, and conversation. Introduction to Bengali script.

INDN 499 Undergraduate Research (3-5, max. 15) Primarily for South Asian language and literature majors. Prerequisite: permission of instructor and undergraduate adviser. Offered: AWSp.

Indonesian

INDON 111, 112, 113 Elementary Indonesian (5, 5, 5) Budiman Introduction to modern standard Indonesian-Malay. Emphasis on grammar and conversational drills. Practice with basic phonological, morphological, and syntactic structures. Prerequisites: 111 for 112, 112 for 113. Offered: A, W, Sp.

INDON 211, 212, 213 Intermediate Indonesian (5, 5, 5) VLPA *Budiman* Continuation of 111, 112, 113. Review/expansion of fundamental grammatical patterns: morphological and syntactic structures, development of conversational skills, reading literary and cultural materials, writing compositions. Prerequisite: 113 or permission of instructor. Offered: A, W, Sp.

INDON 311, 312, 313 Advanced Indonesian (5, 5, 5) VLPA *Budiman* Continuation of 211, 212, 213. Expanding vocabulary; preparing for research work us-

ing original sources; improving reading fluency in modern standard written Indonesian using novels, short stories, newspapers, and other authentic material. Conversation practice centers on discussion of readings. Writing compositions. Prerequisite: 213 or equivalent. Offered: A, W, Sp.

INDON 499 Undergraduate Research (3-5, max. 15) Primarily for Southeast Asian language program majors. Prerequisite: permission of instructor and undergraduate adviser.

Japanese

JAPAN 111, 112, 113 First-Year Japanese (5, 5, 5) Elementary speaking, listening, reading, and writing skills in modern Japanese. No initial knowledge of Japanese presumed. Enrollment in 111 not open to students with prior background. Such students must take placement test. Offered: A, W, Sp.

JAPAN 134 First-Year Intensive Japanese (15) Equivalent of 111, 112, 113. Satisfies requirements for entry to 211, but recommended primarily for those going to Japan shortly upon completion. Offered: S.

JAPAN 211, 212, 213 Second-Year Japanese (5, 5, 5) VLPA Development of further skills in the spoken and written languages. Prerequisite: 113 or placement by examination. Offered: A, W, Sp.

JAPAN 234 Second-Year Intensive Japanese (15) VLPA Equivalent of 211, 212, 213. Satisfies requirements for entry to 311, but recommended primarily for those going to Japan shortly upon completion. Prerequisite: 113 or placement by examination. Offered: S.

JAPAN 311, 312, 313 Third-Year Japanese (5, 5, 5) VLPA *Hasegawa* Intermediate-level skills in both spoken and written languages. Some introduction to unedited materials. Prerequisite: 213 or placement by examination. Offered: A, W, Sp.

JAPAN 342 The Japanese Language (5) VLPA *K Ohta* Survey of the nature and structure of the Japanese language, covering genetic and typological affiliations, writing systems, lexicon, and features of Japanese sentence structures. Prerequisites: 213 or equivalent and LING 200.

JAPAN 343 Japanese Language in Society (5) VLPA/MS Survey of issues in Japanese language use. Areas covered include dialectal variation, language attitudes, gender differences, and pragmatics. Prerequisites: 213, or equivalent, and 342.

JAPAN 405-406 History of the Japanese Language (3-3) VLPA *K Ohta* Introduction to the history of Japanese, including phonology, morphology, syntax, and lexicon. Prerequisite: ASIAN 401. Offered: alternate years.

JAPAN 421, 422, 423 Fourth-year Japanese for Professional and Academic Purposes I, II, III (5, 5, 5) VLPA/MS Class discussion, oral presentations, reading, and composition on topics related to the Japanese language and present-day Japan. Includes readings from Japanese newspapers and magazines. Conducted in Japanese. Prerequisite: 313 for 421, 421 for 422, 422 for 423 or permission.

JAPAN 431, 432, 433 Readings in Modern Japanese Literature (5, 5, 5) VLPA Reading and discussion of selected modern literary texts in the original language, concentrating on the short story and novel. Close attention to grammar and syntax. Prerequisite: 313 or equivalent.

JAPAN 440 Introduction to Japanese Linguistics (5) VLPA *AS Ohta, K Ohta* Overview of major topics in the linguistic description of Japanese: phonology, morphology, syntax, history, dialects, sociolinguistics, and the writing system. Elementary training in phonological, morphological, and syntactic analysis of Japanese. Prerequisite: 313 or equivalent. Recommended: an introductory course in linguistics. Offered: Sp.

JAPAN 442 Morphology and Syntax of Japanese (5) VLPA *K Ohta* Morphological and syntactic analysis of the Japanese language. Reading of research literature, training in analysis of Japanese language data, and contrastive analysis of Japanese with other languages. Prerequisites: 313 or equivalent, 440, and LING 400 or permission of instructor.

JAPAN 443 Japanese Sociolinguistics (5) Methodology and theory of sociolinguistic analysis. Reading of research literature and training in analysis of Japanese language data. Prerequisites: 313 or equivalent and 342 or permission of instructor.

JAPAN 471, 472 Classical Japanese Grammar (5, 5) VLPA Introduction to classical grammatical forms and translation of classical literary texts. Prerequisites: 313 or equivalent for 471; 471 or equivalent for 472. Offered: A, W.

JAPAN 473 Readings in Classical Japanese Literature (5) VLPA Readings in prose, poetry, and drama, antiquity to nineteenth century. Prerequisite: 472 or equivalent. Offered: Sp.

JAPAN 499 Undergraduate Research (3-5, max. 15) For Japanese language and literature majors. Prerequisite: permission of instructor and undergraduate adviser. Offered: AWSpS.

Korean

KOREAN 301, 302, 303 Introduction to Korean (5, 5, 5) Fundamentals of the Korean language. Emphasis on Korean alphabet and spelling, pronunciation, and basic grammar. Offered: A, W, Sp.

KOREAN 304 Spoken Korean (10) VLPA The Korean language as spoken in ordinary conversational situations. Phonetic accuracy and appropriateness of idiom. May be taken any summer after completion of first-year Korean. Prerequisite: 303 or permission of instructor. Offered: irregularly.

KOREAN 311, 312, 313 Introduction to Korean Writing in Mixed Script (5, 5, 5) VLPA Chinese characters as used in Korean mixed script. Systematic expansion of vocabulary and grammatical forms of standard Korean. Prerequisite: 303 or equivalent. Offered: A, W, Sp.

KOREAN 411, 412, 413 Readings in Contemporary Korean (5, 5, 5) VLPA 411 completes the introduction to Korean writing in mixed script of 311, 312, 313. 412 and 413 provide experience in reading a variety of contemporary styles. Materials from published works include informal essays, short stories, one-act plays, academic essays, and newspaper editorials. Prerequisite: 313 or equivalent. Offered: A, W, Sp.

KOREAN 415 Social Science Literature in Korean (3) VLPA Readings in selections from contemporary Korean publications in social science topics. Prerequisite: 413 or equivalent. Offered: A.

KOREAN 416 Korean Narrative and Dramatic Literature (3) VLPA Linguistic features rather than purely literary qualities of modern Korean literature. Includes figures of speech and sophisticated linguistic expression. Prerequisite: 413 or equivalent. Offered: W.

KOREAN 417 Readings in Korean Journals (3) VLPA Selections from Korean newspapers, news magazines, and other journals. Topics from international and domestic affairs, including politics, business, and problems of everyday life. Prerequisite: 413 or equivalent. Offered: Sp.

KOREAN 499 Undergraduate Independent Study (3-5, max. 15) For students who have completed 417 or equivalent. Prerequisite: permission of instructor and undergraduate adviser. Offered: AWSpS.

Sanskrit

SNKRT 301, 302, 303 Introduction to Sanskrit (5, 5, 5) *Cox, Salomon* Basic grammar and vocabulary of the classical language. Reading of elementary texts from the epic or Puranic literature. Offered: A, W, Sp.

SNKRT 401, 402, 403 Intermediate Sanskrit (5, 5, 5) *VLPA Cox, Salomon* Further study of classical grammar; introduction to classical literature and Vedic language and texts. Prerequisite: 303 or permission of instructor. Offered: A, W, Sp.

SNKRT 411, 412, 413 Advanced Sanskrit (5, max. 15, 5, max. 15, 5) *VLPA Cox, Salomon* Reading and analysis of classical texts, chosen according to students' interests. Prerequisite: 403 or permission of instructor. Offered: A, W, Sp.

SNKRT 491, 492, 493 Vedic Studies (3, 3, 3) *VLPA Salomon* Readings of selected Vedic texts, with linguistic, religious, and historical analyses. Includes background material on Vedic religion, literature, and culture. Prerequisite: 303 or equivalent.

SNKRT 494 Readings in Religious Classics of India (5) *VLPA Potter, Salomon* Introduction to the older religious literature, with emphasis on the Upanisads, the Dharmasutras, and the Bhagavad Gita. Rapid reading of the texts, plus content analysis of the developing religious forms. Prerequisite: 402.

SNKRT 495 Studies in Indian Thought (3, max. 9) *VLPA Cox* Religious and philosophical traditions in South Asia. The original documents studied vary from year to year. Prerequisite: 402 or permission of instructor.

SNKRT 499 Undergraduate Research (3-5, max. 15) Primarily for Sanskrit language and literature majors. Prerequisite: permission of instructor and undergraduate adviser. Offered: AWSp.

Thai

THAI 301, 302, 303 Basic Thai (5, 5, 5) *Kesavathana-Dohrs* Introduction to modern spoken and written Thai. Emphasis on spoken language competence with additional skills in elementary reading and spelling. Offered: A, W, Sp.

THAI 401, 402, 403 Intermediate Thai (5, 5, 5) *VLPA Kesavathana-Dohrs* Short stories; articles on Thai history, geography, culture, politics, economics. Primary emphasis on reading, translation, comprehension, and grammar. Prerequisite: 303. Offered: A, W, Sp.

THAI 411, 412, 413 Readings in Thai (5, 5, 5) *VLPA Kesavathana-Dohrs* Advanced reading and translation of selections from various Thai authors, with occasional practice in conversation and composition. Prerequisite: 403. Offered: A, W, Sp.

THAI 499 Undergraduate Research (3-5, max. 25) For Thai language and literature majors. Prerequisite: permission of instructor and undergraduate adviser. Offered: AWSp.

Tibetan

TIB 304, 305, 306 Colloquial Tibetan (5, 5, 5) *Norman* Introduction to phonology, morphology, and syntax of spoken Tibetan, Lhasa dialect. Offered: alternate years; A, W, Sp.

TIB 307, 308, 309 Intermediate Colloquial Tibetan (5, 5, 5) *VLPA Norman* Instruction and drill in advanced colloquial sentence patterns and syntactical constructions. Prerequisite: 306 or equivalent. Offered: alternate years; A, W, Sp.

TIB 311, 312, 313 Literary Tibetan (3, 3, 3) Introduction to the phonology, grammar, and syntax of written Tibetan. Materials selected for rapid development of reading knowledge. Offered: A, W, Sp.

TIB 411, 412, 413 Readings in Tibetan (3, 3, 3) *VLPA* Selections from various Tibetan materials. Prerequisite: 313 or equivalent. Offered: A, W, Sp.

TIB 415, 416, 417 Readings in Tibetan Literature (3, 3, 3) *VLPA* Reading of selections from Tibetan philosophical literature. May be taken in any sequence. Prerequisite: 413 or permission of instructor. Offered: A, W, Sp.

TIB 499 Undergraduate Research (3-5, max. 15) For Asian languages and literature majors. Prerequisite: permission of instructor and undergraduate adviser. Offered: AWSp.

Vietnamese

VIET 111, 112, 113 First-year Vietnamese (5, 5, 5) *Nguyen* Introduction to modern Vietnamese conversation. Emphasis on correct pronunciation, spelling, and sentence structure. Designed for students with no previous exposure to Vietnamese. Offered: A, W, Sp.

VIET 211, 212, 213 Second-year Vietnamese (5, 5, 5) *VLPA Nguyen* Continuation of 113. Development of conversation skills, reading for comprehension, and writing short compositions. Prerequisite: 113. Offered: A, W, Sp.

VIET 214 Accelerated Vietnamese Reading and Writing (5) *VLPA Nguyen* Accelerated course for fluent speakers who do not read or write Vietnamese. Emphasis on reading and writing through second-year level. Cannot be taken for credit in combination with any formal Vietnamese course. Credit/no credit only. Offered: A.

VIET 490 Special Topics in Vietnamese (5, max. 15) *VLPA Nguyen* Content varies. Prerequisite: permission of instructor. Credit/no credit only.

VIET 498 Special Studies in Vietnamese (3-5, max. 15) *Nguyen* Topics vary. Offered: AWSp.

Courses in English

ASIAN 263 Great Works of Asian Literature (5) *VLPA* Selected major works of Asian literature. Taught on a rotational basis with the literary traditions of China, Japan, India covered in successive years. Content varies depending on specialization and interest of instructor. Primary emphasis on literary values of works and their tradition; attention also given to historical and social contexts and the thought and value systems of the culture involved.

CHIN 373 Chinese Poetry (5) *VLPA Wang* Introduction to Chinese poetry. A study of its origins, forms, major themes, and relevant conventions. All readings in English. No knowledge of Chinese required. Offered: W.

CHIN 374 Chinese Prose (5) *VLPA Knechtges* Survey of great works of Chinese prose, including philosophical writings, historical works, short narratives, essays, and rhyme-prose. All readings in English. No knowledge of Chinese required. Offered: Sp.

CHIN 380 The Chinese Novel in English (5) *VLPA Brandauer* The Chinese novel from the Ming dynasty to the present. Readings in English translation. Literary values of works and their tradition. Historical and social contexts and thought and value systems of the Chinese. Offered: Sp.

CHIN 381 Literature in Modern China (5) *VLPA Brandauer* Literature in China from the 1911 revolution to the present. May Fourth literature, Taiwan literature, and People's Republic of China literature. Readings in English translation.

JAPAN 321 Japan in Literature and Film: I (5) *VLPA* Literary history of Japan from the eighth to the late twelfth centuries, with readings in *The Tale of Genji* and other works of the imperial court, with visual aids reflecting the architecture, life, and natural milieu of classical Japan. Offered: A.

JAPAN 322 Japan in Literature and Film: II (5) *VLPA Kobayashi, Treat* Literary history of Japan from the thirteenth to early nineteenth centuries, with readings from court and warrior culture, Edo townsman culture, and films on the no, bunraku puppet, and kabuki theaters. Recommended: 321. Offered: W.

JAPAN 323 Japan in Literature and Film: III (5) *VLPA Kobayashi, Treat* Literary history of Japan in the modern period, with readings in the major novelists on the clash of cultures, the generational struggle, and war, plus films that portray these themes and reflect the variety of modern Japanese life. Recommended: 321, 322. Offered: Sp.

Courses for Graduates Only

Altaic

ALTAI 579 Comparative Altaic Linguistics (3) *Norman* Comparative phonology and morphology of Mongolian, Turkic, and other Altaic languages. Prerequisite: permission of instructor. Offered: jointly with LING 579.

Asian Languages and Literature

ASIAN 503 Seminar in Asian Linguistics (1-5, max. 15) *A Ohta* Topics vary. Prerequisite: permission of instructor. Offered: AWSp.

ASIAN 518 Foreign Language Teaching Methodology (2) *Brandl* Current foreign language teaching methods and approaches. Learning and teaching strategies and techniques for the four skills (reading, writing, speaking, listening) including cultural notions. Current and future trends in pedagogy and technology. Offered: jointly with GERMAN 518/NEAR E 518/SCAND 518/SLAV 518.

ASIAN 585 Seminar in Buddhism (3, max. 27) *Cox* Systems and history of Buddhist thought. Original and secondary sources are used. Combines the methods of specialists in south, central, and east Asian Buddhism with those of historians of religion and philosophy. Prerequisite: permission of instructor. Offered: AWSp.

ASIAN 600 Independent Study or Research (*) Offered: AWSpS.

ASIAN 700 Master's Thesis (*) Offered: AWSpS.

ASIAN 800 Doctoral Dissertation (*) Offered: AWSpS.

Chinese

CHIN 531, 532, 533 Studies in Chinese Phonology (3, 3, 3) *Norman* Sources and methods in the study of Chinese phonology; 531: modern standard Chinese; 532: medieval period; 533: advanced topics in Chinese historical phonology. Prerequisite: ASIAN 401. Offered: A, W, Sp.

CHIN 540 Seminar on Chinese Linguistics (3, max. 9) *Norman, Yue-Hashimoto* Advanced topics in Chinese linguistics. Subject emphasis varies from year to year. Offered: Sp.

CHIN 541 Seminar in Chinese Grammar (3, max. 9) *Boltz, Norman, Yue-Hashimoto* Problems of theory and analysis of Chinese grammar, both synchronic and diachronic, modern and classical. Prerequisites: ASIAN 401 and permission of instructor.

CHIN 542 Chinese Historical Phonology (3) *Norman* Introduction to Chinese historical phonology; emphasis on the Middle Chinese period. Prerequisites: ASIAN 401 and permission of instructor.

CHIN 544 Chinese Dialectology (3, max. 9) *Norman, Yue-Hashimoto* Methodology and theory of studying Chinese dialects. Among areas covered are fieldwork methods, dialect classification, and dialectal grammar. Prerequisites: 542, ASIAN 401, and permission of instructor.

CHIN 551, 552 Second-Year Classical Chinese (5, 5) *Knechtges, Wang* Problems of grammar, rhetoric, and textual criticism. 551: early literary texts. 552: later literary texts. Offered: A, W.

CHIN 553 Second-Year Classical Chinese (5) *Boltz* Continuation of 551, 552. Intermediate level readings in Han and pre-Han historical and philosophical texts. Prerequisites: 551 and 552. Offered: Sp.

CHIN 554, 555, 556 Readings in Chinese Prose (5, 5, 5) *Knechtges* 554: selected readings in the fu of the Han, Wei, Chin, and North-South Dynasties period. 555: selected readings in parallel prose (*pianti wen*). 556: selected readings in *guwen* prose of the T'ang and Sung periods. Recommended: 551, 552. Offered: alternate years.

CHIN 557 Introduction to Chinese Philology and Textual Criticism (5) *Boltz* Principles and methods of textual criticism and philological analysis of ancient Chinese texts. Study of both manuscripts and transmitted texts. Emphasis on Han and pre-Han documents; specific texts vary. Prerequisites: two years of classical Chinese and ASIAN 401. Offered: alternate years; W.

CHIN 558 Seminar in Chinese Lexicology and Grammatonymy (3) *Boltz* Study of the Chinese script, lexicographical history, and lexicological and etymological analysis. Prerequisites: two years of classical Chinese, ASIAN 401. Offered: alternate years.

CHIN 559 Methods and Materials (5) *Knechtges* Introduction to the basic reference works and methods of research in Chinese language and literature. Includes a history of Sinology, survey of basic bibliographies, dictionaries, atlases, catalogs, journals, literary collections, concordances, and other sources. Prerequisites: 551, 552. Offered: alternate years; A.

CHIN 560 Proseminar in Chinese (3-5) *Boltz, Knechtges* Methods and materials in the study of Chinese texts. Problems in textual analysis and Chinese literary history. Prerequisites: 553 and one of 554, 555, and 556.

CHIN 561, 562, 563 Studies in Chinese Literature (5, 5, 5) *Wang* 561: literature before Ch'in; 562: poetry of the T'ang and Sung periods; 563: literary theory and criticism. Prerequisite: permission of instructor. Offered: 561 W; 562 Sp.

CHIN 573 Seminar in Chinese Poetry (5, max. 15) *Wang* Directed study of selected works of poetry. Subject emphasis varies each year. Prerequisite: permission of instructor. Offered: alternate years; W.

CHIN 574 Seminar in Six Dynasties Literature (5, max. 15) *Knechtges* Directed study of selected works of Six Dynasties. Subject emphasis varies each year. Prerequisite: permission of instructor. Offered: alternate years; Sp.

CHIN 575 Studies in Chinese Drama (5, max. 15) *Wang* Readings and discussion of Chinese drama. Subject emphasis varies. Prerequisite: permission of instructor. Offered: alternate years.

CHIN 577 Advanced Readings in Chinese Opera (4) *Hsia* Introduction to the dialogue and verses frequently used in Chinese opera. Comparisons between language spoken daily and languages used in Chinese opera. Prerequisite: 553 or permission of instructor. Offered: A.

CHIN 578 Advanced Readings in Classical Chinese (4) *S Norman* Study of texts from all periods. Prerequisite: 553 or permission of instructor. Offered: W.

CHIN 580 Readings in Vernacular Chinese Fiction (5, max. 15) *Brandauer* Readings and discussion of traditional vernacular texts. Emphasis on Sung, Yuan, and Ming short stories and on Ming and Ch'ing full-length novels. Prerequisite: permission of instructor. Offered: A.

CHIN 582 Seminar in Chinese Fiction (5, max. 15) *Brandauer* Directed study of selected works of fiction, focusing on the vernacular short story and novel. Prerequisite: permission of instructor. Offered: W.

CHIN 583 Seminar in Modern Chinese Literature (5) *Brandauer* Directed study of selected works of modern Chinese literature. Primary focus on the novel, short story, and essay. Recommended: 381, 482. Offered: Sp.

CHIN 590 Readings in the Thirteen Classics (5) *Boltz* Selected readings from the Thirteen Classics, and from their associated exegetic and hermeneutic traditions. Readings and emphases vary from year to year. Prerequisite: two years of Classical Chinese and 557. Offered: alternate years.

CHIN 591, 592, 593 Studies in the History of Chinese Thought (5, 5, 5) *Knechtges* Directed readings in selected traditional philosophical texts. 591: Han through T'ang; 592: Sung and Yuan; 593: Ming and Ch'ing. Prerequisite: permission of instructor.

Hindi

HINDI 501 Studies in Medieval Braj Literature (3, max. 9) Introduction to the Braj dialect of Hindi and its literature. Prose readings and selected poetry by Surdas, Raskhan, Bihari, and others. Prerequisites: 403 or equivalent. Offered: A.

HINDI 502 Studies in Medieval Avadhi Literature (3, max. 9) Introduction to the Avadhi dialect of Hindi and its literature. Readings from Ramcaritmanas of Tulsidas and Padmavat of Muhammad Malik Jayasi. Prerequisite: 403 or equivalent. Offered: W.

HINDI 503 Studies in Medieval Sant Literature (3, max. 9) *Shapiro* Introduction to the language and literature of Sant poets. Readings include Guru Nanak's Japuji and excerpts from Kabir's Granthavali. Prerequisite: 403 or equivalent.

HINDI 504 Studies in Medieval Rajasthani Literature (3) Introduction to the literary language of Rajasthan. Reading of extracts from the prose chronicle (Khyat) of Nainasi followed by a representative selection of bardic poetry. Prerequisite: 403 or equivalent.

HINDI 510 Structure of Hindi (3) *Shapiro* Grammatical analysis of Hindi, phonology, syntax, and semantics. Readings from both Western and native grammarians. Prerequisite: 403 or permission of instructor. Recommended: course in linguistics.

Indian

INDN 530 Readings in Pali Literature (3, max. 18) *Cox* Reading and interpretation of intermediate and advanced texts in Pali. Prerequisite: 402 or equivalent.

INDN 590 Special Topics in Indology (1-5, max. 12) Studies in selected research topics in South Asian languages and literatures. Prerequisite: graduate standing and permission of instructor. Offered: Sp.

Japanese

JAPAN 501 Readings in Bibliographic Materials (5)

JAPAN 510 Teaching Assistant Training Workshop (3) *AS Ohta* Introduction to issues and methods in teaching Japanese in the American college classroom. Required for all new Japanese teaching assistants. Must be taken in conjunction with ASIAN 518. Prerequisite: Permission of instructor. Offered: A.

JAPAN 531, 532, 533 Advanced Readings in Modern Japanese Literature (5, 5, 5) *Kobayashi* Rapid reading of modern literary and critical texts. Prerequisite: 433 or equivalent. Offered: A, W, Sp.

JAPAN 540 Seminar on Japanese Linguistics (3, max. 9) *K Ohta*. Problems in the history and struc-

ture of the Japanese language. Topics vary each quarter, according to the needs and interests of the students. Prerequisites: 440 or permission of instructor. Offered: W.

JAPAN 561 No and Kyogen (5, max. 15) Close reading and analysis of no texts in Japanese, with some attention to kyogen. Discussion of categorization, structure, imagery, style, mode, theme, authorship, source material, theory, and problems of translation. Prerequisites: 472 or equivalent and permission of instructor.

JAPAN 571, 572, 573 Advanced Readings in Classical Japanese Literature (5, 5, 5) Continued readings in classical literary texts. Prerequisite: 473 or permission of instructor.

JAPAN 580 Development of Modern Japanese Fiction (5, max. 15) *Treat* Reading and translation of major works of modern fiction, with emphasis on the chronological development of modern prose style and practice in literary translation. Prerequisite: permission of instructor. Offered: A.

JAPAN 590 Seminar in Japanese Literature (5, max. 15) Close examination of selected periods, writers, or genres, including problems of literary criticism in Japanese literature. Prerequisite: permission of instructor. Offered: Sp.

Korean

KOREAN 501, 502, 503 Seminar in Korean Linguistics (3-5, 3-5, 3-5) Topics in Korean linguistics. For majors in Korean language and literature or linguistics. Prerequisites: background in linguistics and permission of instructor.

Sanskrit

SNKRT 550 Seminar on Sanskrit Literature (3, max. 9) *Salomon* Detailed study of selected authors, periods, or traditions, within the context of Indian literary history. Prerequisite: 403 or permission of instructor.

SNKRT 555 Seminar on Sanskrit Grammar (3, max. 6) *Salomon* Reading and critical study of traditional literature on grammar and language, including texts of Paninian and other schools. Offered: A.

SNKRT 560 Readings in Philosophical Sanskrit (3, max. 9) *Cox, Potter, Salomon* Intensive reading and analysis of Hindu or Buddhist philosophical texts. Prerequisite: 494 or permission of instructor. Offered: AWSp.

SNKRT 570 Seminar in Indian Epigraphy and Palaeography (3, max. 6) *Salomon* Introduction to the study of inscriptions and other original documents in Sanskrit and Prakrit languages and in Kharosthi, Brahmi, and derived scripts. History of writing in India and development of Indic scripts. Methods of critical evaluation of inscriptions as sources of political and cultural history. Prerequisite: 403.

SNKRT 581, 582 Readings in Buddhist Texts (3, max. 9, 3, max. 9) *Cox* Interpretation of original sources. Texts vary from year to year. Prerequisites: ability to study sources in the original languages, an introduction to Buddhist thought, and permission of instructor. Offered: 581 W.

Tibetan

TIB 511, 512, 513 Advanced Literary Tibetan (3, max. 9; 3, max. 9; 3, max. 9) Reading of manuscripts and xylographs with emphasis on biographical, historical, and geographical material. Prerequisite: 413 or equivalent.

TIB 531, 532, 533 Buddhist Tibetan (3, max. 9; 3, max. 9; 3, max. 9) Reading and analysis of Tibetan Buddhist texts and associated literature. Selections vary each quarter and may be taken out of sequence. Prerequisite: 413 or permission of instructor. Offered: A, W, Sp.

TIB 541 Introduction to Tibetan Philology (3) Philological methods in the study of Tibetan texts, blockprints as well as hand-written manuscripts. Specific examples taken from historical, biographical, and autobiographical writings. Emphasis on historical philology and semantics. Prerequisites: 413 or 417 and permission of instructor.

Astronomy

C319 Physics-Astronomy

Modern research in astronomy and astrophysics encompasses a large number of disciplines and specialties, and the faculty members of the Department of Astronomy are active in many of these areas. Research areas of the department include planetary astronomy, stellar structure and evolution, interstellar matter, x-ray sources, galactic structure, extragalactic astronomy, galactic dynamics, quasars and galactic nuclei, and theoretical and observational cosmology. The department is part of a consortium of universities which operates a 3.5-meter optical/infrared telescope located on Sacramento Peak, New Mexico, and is a partner in the innovative Sloan Digital Sky Survey. Students also have access to a variety of national facilities, such as the Kitt Peak and Cerro Tololo observatories and the Very Large Array. A variety of research is conducted with satellite instruments such as the Hubble Space Telescope. The department operates a well-instrumented 30-inch telescope at the Manastash Ridge Observatory, near Ellensburg. Data analysis and theoretical research are conducted on the department's cluster of SUN and SGI computers, and on a variety of UW and national supercomputer facilities. Undergraduate majors often assist faculty members in acquisition, reduction, and interpretation of data.

Undergraduate Program

Adviser
Woodruff Sullivan
C318 Physics-Astronomy

Bachelor of Science

Major Requirements: 321, 322, 323; 421, 422, 423, or 9 credits of other astronomy 400-level courses; PHYS 121/131, 122/132, 123/133; 224, 225, 227, 228; 321, 322, 334, 335; MATH 124, 125, 126; 307, 324; 9 additional credits in courses at the 300 level or above in physics (chosen from 323, 324, 327, 328, 331, 421, 422, 423, 424, 425, 426, 431, 432, 433, 434) or engineering as approved by adviser. Junior year (survey) and senior year (research) papers recommended as ASTR 499 projects, with emphasis on the senior paper for students planning graduate work. No grade lower than 2.0 is acceptable in courses fulfilling the above requirements. Undergraduates interested in advanced work in astronomy are advised to take a double major in astronomy and physics. Undergraduates interested in immediate employment at an observatory or other scientific institution should include computing and electronics courses as part of their program.

Graduate Program

Bruce Balick, Graduate Program Coordinator

Master of Science, Doctor of Philosophy

A series of graduate courses in solar system, stellar, galactic, and extragalactic astrophysics is offered.

The heart of the graduate program is the collaboration of student and faculty members in research at the frontiers of astronomy. Students work collaboratively with members of the faculty to develop the techniques and insight necessary for successful research, and,

subsequently, to define a thesis topic. The student's thesis research may be purely theoretical or use observational material (obtained through the facilities of either the University of Washington or one of the national observatories) or a combination. Active research programs are being carried out in the area of stellar interiors, stellar atmospheres, planetary atmospheres and surfaces, x-ray sources, interplanetary dust, extragalactic astronomy, gravitation, interstellar matter, dark matter, cosmology, relativistic astrophysics, and computational astrophysics.

Admission Qualifications

Entering students are not required to have a background in astronomy, although some knowledge of general astronomy is expected of those to whom a teaching assistantship is to be offered. Undergraduates interested in a graduate program in astronomy are urged to concentrate on preparation in physics and mathematics before entering.

Assistantships

Normally all students making satisfactory academic progress receive financial support. Over half of the department's graduate students hold fellowships or research assistantships. A number of teaching assistantships are available, primarily in the elementary astronomy courses.

Correspondence and Information

Graduate Program Coordinator
Department of Astronomy, Box 351580
office@astro.washington.edu

Faculty

Chair

Craig J. Hogan

Professors

Adams, John B. * 1975, (Adjunct); MS, 1958, PhD, 1961, University of Washington; planetology, remote sensing.

Balick, Bruce * 1975; PhD, 1971, Cornell University; radio astronomy, ionized nebulae, peculiar galaxies.

Bardeen, James M. * 1976, (Adjunct); PhD, 1985, California Institute of Technology; general relativity, theoretical astrophysics.

Bohm, Karl-Heinz * 1967, (Emeritus); PhD, 1954, University of Kiel (Germany); stellar atmospheres, star formation.

Bohm-Vitense, Erika H. * 1968, (Emeritus); PhD, 1951, University of Kiel (Germany); stellar atmospheres, pulsating stars.

Boynton, Paul * 1970; PhD, 1967, Princeton University; high-energy astrophysics, astronomy.

Brownlee, Donald E. * 1971; PhD, 1971, University of Washington; origin of the solar system, comets, interplanetary dust.

Haxton, Wick C. * 1984, (Adjunct); PhD, 1976, Stanford University; theoretical physics, nuclear physics.

Hodge, Paul W. * 1965; PhD, 1960, Harvard University; extragalactic astronomy, interplanetary dust.

Hogan, Craig J. * 1990; PhD, 1980, Cambridge University (UK); astrophysical cosmology, especially the origin of astronomical structures in the expanding universe.

Jacobsen, Theodor S. 1928, (Emeritus); PhD, 1926, University of California (Berkeley); astronomy.

Lake, George Russell * 1985; PhD, 1980, Princeton University; stellar dynamics, galaxy structure and formation, cosmology, computational astrophysics.

Leovy, Conway B. * 1967, (Adjunct); PhD, 1964, Massachusetts Institute of Technology; planetary atmospheres, middle atmosphere meteorology, remote sensing.

Margon, Bruce H. * 1980; PhD, 1973, University of California (Berkeley); galactic and extragalactic x-ray astronomy, optical counterparts of x-ray sources.

Sullivan, Woodruff T. III * 1973; PhD, 1971, University of Maryland; radio astronomy, galactic and extragalactic structure, history of astronomy.

Szkody, Paula * 1975; PhD, 1975, University of Washington; cataclysmic variables, photometry, spectroscopy.

Wallerstein, George * 1965; PhD, 1958, California Institute of Technology; chemical composition of stars, peculiar stars, interstellar matter.

Associate Professors

Anderson, Scott F. * 1988, (Research); PhD, 1985, University of Washington; quasars and active galaxies, x-ray astronomy.

Nelson, George D. * 1989; PhD, 1978, University of Washington; stellar atmospheres, radiative transfer, hydrodynamics.

Stubbs, Christopher 1994; PhD, 1988, MSc, 1988, University of Washington.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

ASTR 101 Astronomy (5) NW, QSR Introduction to the universe, with emphasis on conceptual, as contrasted with mathematical, comprehension. Modern theories, observations; ideas concerning nature, evolution of galaxies; quasars, stars, black holes, planets, solar system. Not open for credit to students who have taken 102 or 201; not open to upper-division students majoring in physical sciences or engineering.

ASTR 102 Introduction to Astronomy (5) NW, QSR Subject matter similar to 101 but designed for students who have had high school physics or the equivalent introduction to physics at the college level. Cannot be taken for credit in combination with 101, 201, or 301. Prerequisites: one year of high school physics or PHYS 101-102 or PHYS 110, 111, 112.

ASTR 150 The Planets (5) NW, QSR For liberal arts and beginning science students. Survey of the planets of the solar system, with emphases on recent space exploration of the planets and on the comparative evolution of the Earth and the other planets.

ASTR 190 Modern Topics in Astronomy for Non-Science Majors (3) NW Topics of current interest, such as origin of chemical elements, novae and supernovae, white dwarfs, neutron stars, black holes, active galaxies, quasars, or interstellar medium and astrochemistry. Choice of topics depends on instructor and class interest. Prerequisite: 5 credits of astronomy courses at the 100 or 200 level or permission of instructor.

ASTR 201 The Universe and the Origin of Life (5) NW, QSR Sequel to 101 or 102, emphasizing modern views of the atomic and molecular evolution of the universe from the initial "big bang" through the formation of the solar system and the emergence of biological forms on the earth. The latter part of the course considers questions about the existence of, and communication with, extraterrestrial intelligent life, and finally the ultimate fate of the cosmos. Prerequisite: 101 or 102, or PHYS 110 or 114 or 121.

ASTR 210 Distance and Time: Size and Age in the Universe (5) NW, QSR Space and time as basic concepts in physical science. How we define and

measure them, how the concepts have developed over the centuries, and how modern measurements allow us to determine the size and age of the universe.

ASTR 211 The Universe and Change (5) NW, QSR Gravity as central to the form and evolution of the universe. Conceptual formulation of gravity from the Renaissance to Einstein. Its consequences from the falling of an apple to the slowing of the expansion of the universe. Prerequisite: 210.

ASTR 212 Life in the Universe (5) NW, QSR Nature and origin of cosmic large numbers. Steps to the formation of life, formation of planets (stars, galaxies, a long-lived universe), the anthropic principle. Searches for other planetary systems and extraterrestrial life. Prerequisite: 101 or 211.

ASTR 301 Astronomy for Scientists and Engineers (3) NW Introduction to astronomy for students in the physical sciences or engineering. Topics similar to 101, but the approach uses more mathematics and physics. Prerequisite: PHYS 123.

ASTR 313 Science in Civilization: Physics and Astrophysics Since 1850 (5) I&S/NW Organization and pursuit of the physical and astrophysical sciences, focusing on the major unifying principles of physics and astronomy and the social and cultural settings in which they were created. Offered: jointly with HIST 313.

ASTR 321 The Solar System (3) NW Solar system; planetary atmospheres, surfaces and interiors, the moon, comets. The solar wind and interplanetary medium. Formation of the solar system. Prerequisites: PHYS 224, which may be taken concurrently.

ASTR 322 The Contents of Our Galaxy (3) NW Introduction to astronomy. Basic properties of stars, stellar systems, interstellar dust and gas, and the structure of our galaxy. Prerequisites: PHYS 224, 225, which may be taken concurrently.

ASTR 323 Extragalactic Astronomy and Cosmology (3) NW Galaxies, optical and radio morphology and properties. Clusters of galaxies, radio sources, and quasars. Observational cosmology. Prerequisites: 322 and PHYS 224, 225, 227, which may be taken concurrently.

ASTR 421 Stellar Observations and Theory (3) NW Observations and theory of the atmospheres, chemical composition, internal structure, energy sources, and evolutionary history of stars. Prerequisites: 322, and PHYS 224, 225, 227, 228.

ASTR 422 Interstellar Material (3) NW Description and physics of the matter between the stars. Physical conditions, distribution, evolution, and motions of interstellar atoms, molecules, and dust grains. Exchange of energy and matter between stars and interstellar material. Prerequisites: 322, and PHYS 224, 225, 227, 228.

ASTR 423 High-Energy Astrophysics (3) NW High-energy phenomena in the universe. Includes supernova, pulsars, neutron stars, x-ray and gamma-ray sources, black holes, cosmic rays, quasi stellar objects, active galactic nuclei, diffuse background radiations. Radiative emission, absorption processes, and models derived from observational data. Prerequisites: PHYS 224, 225, 227, 228, or equivalent, or permission of instructor.

ASTR 480 Introduction to Astronomical Data Analysis (3) NW Hands-on experience with electronic imaging devices (CCDs) and software for image reduction and analysis. Introduction to operating systems, reduction software, and statistical analysis with applications to CCD photometry.

ASTR 481 Introduction to Astronomical Observation (3) NW Theory and practice of obtaining optical data at a telescope. Preparation, obtaining data with a CCD on a telescope, and subsequent data analysis for completion of a research project. Prerequisite: 480.

ASTR 497 Topics in Current Astronomy (1-3) NW Recent developments in one field of astronomy or astrophysics. Prerequisite varies according to the subject matter.

ASTR 499 Undergraduate Research (* max. 15) Special astronomical problems and observational projects, by arrangement with instructor. Prerequisite: permission of instructor.

Courses for Graduates Only

ASTR 500 Seminar in Elementary Astronomy Instruction (1, max. 5) Seminar in the preparation of lecture and workshop materials with emphasis on demonstration, visual aids, and the evaluation of students' progress. Credit/no credit only.

ASTR 507 Physical Foundations of Astrophysics I (3) Thermodynamics from an astronomer's point of view: black body radiation, basic radiative transfer, equation of state, degenerate gases, crystallization at high density.

ASTR 508 Physical Foundations of Astrophysics II (3) Introduction to astronomical hydrodynamics and magnetohydrodynamics, basic theorems and application to stellar and interstellar magnetic fields. Introduction to plasma physics, waves in a plasma.

ASTR 509 Physical Foundations of Astrophysics III (3) Potential theory as applied to astrophysical systems. Orbits. Integrals of motion. Equilibrium and stability of stellar systems. Encounters of Stellar Systems. Kinetic theory of collisional systems. Applications of stellar dynamics to star clusters, galaxies, and large-scale structure.

ASTR 511 Galactic Structure (3) Kinematics, dynamics, and contents of the galaxy. Spiral structure. Structure of other galaxies. Evolution of galaxies.

ASTR 512 Extragalactic Astronomy (3) Types of galaxies. Integrated properties, content, and dynamics. Extragalactic distance scale, groups and clusters. Radio sources. Observational cosmology.

ASTR 513 Cosmology (3) Homogeneous isotropic models. Microwave and x-ray background radiation. Nucleosynthesis, baryosynthesis, inflation, and galaxy formation. Dark matter.

ASTR 521, 522 Stellar Atmospheres (3, 3) Theory of continuous radiation and spectral line formation. Applications to the sun and stars. Prerequisite: PHYS 421 or equivalent.

ASTR 523 Solar Physics (3) Sun as a star, solar photosphere and outer convection zone, granulation and related phenomena, solar chromosphere, and corona, solar activity (especially sunspots and solar flares), sun's radio emission, solar-terrestrial relations.

ASTR 531 Stellar Interiors (4) Physical laws governing the temperature, pressure, and mass distribution in stars. Equation of state, opacity, nuclear energy generation, computational methods. Models of main sequence stars. Prerequisite: PHYS 421 or equivalent.

ASTR 532 Stellar Evolution (3) Theoretical and observational approaches to stellar evolution. Structure of red giants, supernovae and white dwarfs. Observations of star clusters and the chemical composition of stars as the relate to the theory of stellar structure. Prerequisite: 531.

ASTR 541 Interstellar Matter (3) Physical conditions and motions of neutral and ionized gas in interstellar space. Interstellar dust, magnetic fields, formation of grains, clouds, and stars. Prerequisite: modern physics or permission of instructor.

ASTR 555 Planetary Atmospheres (3) Problems of origin, evolution, and structure of planetary atmospheres, emphasizing elements common to all; roles of radiation, chemistry, and dynamical processes; new results on the atmospheres of Venus, Mars, Jupiter,

and other solar system objects in the context of comparative planetology. Offered: jointly with ATM /S/ GPHYS 555.

ASTR 556 Planetary Surfaces (3) Comparison of surface processes and conditions on Mercury, Venus, Earth, moon, Mars, asteroids, and satellites of the great planets. Emphasis on understanding how and why planetary surfaces differ from one another and the implied course of solar-system evolution. Analysis of data from Earth-based telescopes and manned and unmanned space missions. Offered: jointly with GEOL/ GPHYS 556.

ASTR 557 Origin of the Solar System (3) Nebular and nonnebular theories of the solar system origin; collapse from the interstellar medium, grain growth in the solar nebula, formation of planetesimals and planets, early evolution of the planets and other possible planetary systems; physical and chemical evidence upon which the ideas concerning the origin of the solar system are based. Offered: jointly with GEOL/GPHYS 557.

ASTR 561 High Energy Astrophysics (3) Observed properties of supernovae, x-ray stars, radio sources, quasars. Theories explaining such objects. Origin of cosmic rays.

ASTR 575 Seminar in Astronomy (1-2, max. 20) Discussion of recent research in astronomy and astrophysics. Credit/no credit only. Prerequisite: permission of department.

ASTR 576 Astronomy Colloquium (1, max. 20) Current research topics in astronomy and astrophysics. Credit/no credit only. Prerequisite: permission of department.

ASTR 581 Techniques in Optical Astronomy (5) Theory and practice of obtaining optical data. Astronomical photoelectric photometers, spectrographs, interferometers, CCDs, and infrared equipment. Data-reduction techniques with emphasis on statistical analysis using digital computers. Observations with MRO thirty-inch telescope.

ASTR 597 Topics in Observational Astrophysics (1-5, max. 20) Credit/no credit only.

ASTR 598 Topics in Theoretical Astrophysics (1-5, max. 20) Credit/no credit only.

ASTR 599 Advanced Astronomy Seminar (1-3, max. 6) Practical exercises in astrophysics. Emphasis on methods and techniques of simulation, acquisition, evaluation, and analysis of observational data and its interpretation using models of astrophysical systems. Prerequisite: permission of instructor.

ASTR 600 Independent Study or Research (*)

ASTR 700 Master's Thesis (1, max. 9)

ASTR 800 Doctoral Dissertation (*)

Atmospheric Sciences

408 Atmospheric Sciences-Geophysics

At the undergraduate level, the department provides a curriculum that covers both theoretical and applied aspects of the field. Courses offered include dynamical meteorology, cloud physics, radiative transfer, turbulence, atmospheric chemistry, and weather analysis and prediction. The Bachelor of Science degree qualifies students for professional employment in weather forecasting, air-quality control and monitoring, and other areas of atmospheric sciences and related fields. The baccalaureate degree also is appropriate preparation for graduate study in atmospheric sciences. Students majoring in physical science, mathematics,

or engineering who plan to pursue graduate study in atmospheric sciences may take a subset of the undergraduate courses (listed below) to aid in their preparation. Special arrangements are made for students opting for an honors curriculum. A degree in mathematical sciences with an atmospheric sciences option is offered by the Department of Mathematics.

Undergraduate Program

Adviser
408B Atmospheric Sciences-Geophysics

Bachelor of Science

Admission Requirements: MATH 124, 125, 126; PHYS 121/131, 122/132, 123/133; with a grade of at least 2.5 in each of these courses. Special circumstances will be reviewed on a case-by-case basis.

Major Requirements: 301, 302, 321, 340, 350, 370, 431, 441, 442, 451, 452 and either 358 or 458; CSE/ENGR 142; MATH 124, 125, 126; AMATH 351, 353; MATH 324; PHYS 121/131, 122/132, 123/133; CHEM 140. MATH 307, 308, 309 may be taken in place of AMATH 351, 353. The following courses are recommended: AMATH 352; PHYS 224, 225; CHEM 150, 160. A grade of 2.0 or better in each of the required courses in atmospheric sciences, mathematics, physics, engineering, and chemistry; and an overall GPA in these courses of 2.50.

Pregraduate Program for Physical Science, Mathematics, and Engineering Majors

The following elective course sequence is suitable preparation for students interested in pursuing graduate study in atmospheric sciences: ATM S 301, 340, 441.

Minor

Minor Requirements: ATM S 301, 302 and other approved courses to total not less than 25 credits. Suggested tracks include: (1) Atmospheric Chemistry—ATM S 340, 431, 458 and 480; (2) Synoptic/Dynamic Meteorology—ATM S 370, 441, 442, 452; (3) Physical Meteorology—ATM S 340, 370, 431, 441. Minors may include a maximum of 6 credits of independent study. 2.0 minimum grade required in each course.

Graduate Program

Graduate Program Coordinator
408B Atmospheric Sciences-Geophysics

Master of Science, Doctor of Philosophy

Admission to the graduate program requires a baccalaureate degree in physical science, engineering, or mathematics, or its equivalent, as well as the Graduate Record Examination. The program of graduate study varies with each individual.

During the first year of graduate study, most students concentrate on developing a strong background in the fundamentals that underlie the atmospheric sciences and on getting a broad understanding of the wide range of problems encountered in the atmosphere. A qualifying examination is given toward the end of the first year of graduate study as soon as possible after the student has completed 24 credits, including 12 credits in courses numbered 500 and above. All students desiring to proceed toward the Ph.D. degree must take this examination, and students desiring the Master of Science degree may elect to take it. This examination tests understanding of the fundamental aspects of the atmospheric sciences and of the relevant mathematics and physics. Physical reasoning, rather than factual information, is stressed. Those who pass the examination with distinction are encouraged

to work toward the Ph.D. degree; those who pass continue toward the Master of Science degree. Students whose objective is the Master of Science degree may elect to submit a written thesis proposal in lieu of the qualifying examination.

Research assistantships and a few teaching assistantships are available to full-time students. Applications are made through the department office.

Correspondence and Information

Academic Counselor
408B Atmospheric Sciences-Geophysics,
Box 351640

Faculty

Chair

Norbert Untersteiner

Professors

Badgley, Franklin * 1953, (Emeritus); MS, 1948, PhD, 1951, New York University; atmospheric turbulence and diffusion.

Baker, Marcia * 1980; MS, 1960, Stanford University; PhD, 1971, University of Washington; cloud physics, atmospheric geophysics.

Brown, Robert A. * 1970, (Research); PhD, 1969, University of Washington; planetary boundary layers, air-sea interaction, turbulence, remote sensing.

Businger, Joost A. * 1958, (Emeritus); PhD, 1954, University of Utrecht (Netherlands); boundary layer meteorology, atmosphere-ocean interaction.

Charlson, Robert J. * 1965; PhD, 1964, University of Washington; atmospheric chemistry, aerosol physics, aerosol/cloud/climate interaction, instrumentation.

Durrant, Dale R. * 1987; PhD, 1981, Massachusetts Institute of Technology; atmospheric dynamics, mesoscale meteorology, numerical modeling.

Fleagle, Robert G. * 1948, (Emeritus); PhD, 1949, New York University; air-sea interaction, science policy.

Grenfell, Thomas C. * 1980, (Research); PhD, 1972, University of Washington; radiative transfer, remote sensing, sea-ice optics, microwave theory.

Harrison, Don Edmunds * 1985, (Affiliate); PhD, 1977, Harvard University; ocean circulation modeling, air-sea interaction, ocean and climate dynamics.

Hartmann, Dennis L. * 1977; PhD, 1975, Princeton University; climate theory, dynamic meteorology, radiation and remote sensing.

Hegg, Dean A. * 1980, (Research); PhD, 1979, University of Washington; atmospheric chemistry, cloud physics.

Hobbs, Peter V. * 1963; PhD, 1963, University of London; Imperial College; aerosol/cloud/precipitation physics, atmospheric chemistry, air pollution, mesoscale meteorology.

Holton, James Reed * 1965; PhD, 1964, Massachusetts Institute of Technology; dynamic meteorology, middle atmosphere meteorology.

Houze, Robert A. * 1972; PhD, 1972, Massachusetts Institute of Technology; mesoscale meteorology, cloud physics and dynamics, tropical meteorology.

Katsaros, Kristina * 1969; PhD, 1969, University of Washington; air-sea interaction, radiative surface fluxes, remote sensing.

LaChapelle, Edward * 1955, (Emeritus); ScD, 1967, University of Puget Sound; snow-cover geophysics.

Leovy, Conway B. * 1967; PhD, 1964, Massachusetts Institute of Technology; planetary atmospheres, middle atmosphere meteorology, remote sensing.

Mass, Clifford F. * 1981; PhD, 1978, University of Washington; synoptic and mesoscale meteorology.

Maykut, Gary * 1969, (Research); PhD, 1969, University of Washington; polar air-sea-ice interaction, radiative transfer in ice and snow.

Overland, James E. * 1983, (Affiliate); PhD, 1973, New York University; arctic, coastal and marine meteorology, sea ice.

Parks, George K. * 1971, (Adjunct); PhD, 1966, University of California (Berkeley); particles and waves in auroral, magnetospheric, and interplanetary space plasma phenomena.

Plant, William J. 1992, (Affiliate); PhD, 1972, Purdue University; remote sensing, atmosphere-ocean interaction.

Radke, Lawrence F. * 1968, (Affiliate); PhD, 1968, University of Washington; cloud and aerosol physics, remote sensing, airborne instrumentation and application.

Reed, Richard J. * 1954, (Emeritus); DSc, 1949, Massachusetts Institute of Technology; weather analysis and prediction, numerical modeling.

Rhines, Peter B. * 1984; PhD, 1967, Cambridge University (UK); the circulation of the oceans and evolution of climate.

Sarachik, Edward * 1984; PhD, 1966, Brandeis University; large scale ocean/atmosphere interaction, equatorial dynamics, climate change.

Tillman, James E. 1972, (Research); MS, 1961, Massachusetts Institute of Technology; Mars meteorology, humidity and temperature instrumentation, planetary boundary layer.

Tung, Ka Kit * 1988, (Adjunct); PhD, 1977, Harvard University; atmospheric and geophysical fluid dynamics.

Untersteiner, Norbert * 1962; PhD, 1950, University of Innsbruck (Austria); air-sea-ice interaction, polar climatology, sea ice physics.

Wallace, John M. * 1966; PhD, 1966, Massachusetts Institute of Technology; atmospheric dynamics, large-scale motions.

Warren, Stephen G. * 1981; PhD, 1973, Harvard University; atmospheric radiation, climatology, glaciology.

Zoller, William H. * 1984, (Adjunct); PhD, 1969, Massachusetts Institute of Technology; analytical, environmental, and nuclear chemistry.

Associate Professors

Bates, Timothy S. * 1990, (Affiliate); PhD, 1988, University of Washington; oceanic and atmospheric chemistry, atmosphere-ocean interaction, aerosols and climate.

Battisti, David S. * 1990; PhD, 1988, University of Washington; large-scale atmosphere-ocean dynamics, climate dynamics, tropical circulation.

Breidenthal, Robert E. * 1980, (Adjunct); PhD, 1979, California Institute of Technology; turbulence, mixing, combustion, vorticity.

Bretherton, Christopher S. * 1984; PhD, 1984, Massachusetts Institute of Technology; convective cloud systems, mesoscale meteorology, climate theory.

Covert, David S. * 1975, (Research); PhD, 1974, University of Washington; atmospheric chemistry, aerosol physics and instrumentation.

Ferek, Ronald * 1985, (Research); PhD, 1982, Florida State University; atmospheric chemistry, global tropospheric chemistry, acid precipitation.

Ghan, Steven J. 1993, (Affiliate); MS, 1981, PhD, 1988, Massachusetts Institute of Technology; clouds/aerosol/tropospheric chemistry, climate modeling.

Harrison, Halstead * 1971; PhD, 1960, Stanford University; atmospheric chemistry, dispersion modeling, radiative transfer.

Locatelli, John D. 1976, (Research); BS, 1967, University of Washington, cloud and precipitation physics, synoptic and mesoscale meteorology.

Smull, Bradley F. 1996, (Research); PhD, 1986, University of Washington, mesoscale and radar meteorology, tropical meteorology, atmosphere-ocean interaction.

Assistant Professors

Alexander, M. Joan 1992, (Research); PhD, 1992, University of Colorado (Denver); middle atmosphere gravity waves, upper atmosphere of Earth, Venus, Mars.

Yin, Fenglin 1990, (Research); PhD, 1990, Columbia University, large-scale ocean circulation, climate variability, geophysical fluid dynamics.

Zhang, Chidong 1991, (Research); PhD, 1989, Pennsylvania State University, climate dynamics, large-scale atmosphere-ocean interaction, tropical convection.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

ATM S 101 Weather (5) NW The earth's atmosphere, with emphasis on weather observations and forecasting. Daily weather map discussions. Highs, lows, fronts, clouds, storms, jet streams, air pollution, and other features of the atmosphere. Physical processes involved in weather phenomena. Intended for nonmajors. Offered: AWPSP.

ATM S 211 Climate and Climate Change (5) NW The nature of the global climate system. Factors influencing climate including interactions among the atmosphere, oceans, solid earth, and biosphere. Stability and sensitivity of climate system. Global warming, ozone depletion, and other human influences. Intended for non-majors. Offered: AWPSP.

ATM S 301 Introduction to Atmospheric Sciences (5) NW Composition and structure of the atmosphere. Clouds and weather phenomena. Thermodynamic processes. Solar and terrestrial radiation. Air motions. Daily weather discussions and forecasts. For majors and nonmajors. Prerequisites: PHYS 121, 122, 123 and MATH 124, 125, 126. Offered: A.

ATM S 302 Computer Applications for Atmospheric Sciences (2) NW Basic computer programming for the analysis of meteorological data. Introduction to UNIX, editors, and FORTRAN. Brief introduction to DOS/Windows systems. Prerequisite: concurrent registration in 301. Offered: A.

ATM S 321 Physical Climatology (3) NW Evolution and present state of earth's climate. Emphasis on physical processes determining the climate of the earth's atmosphere and surface: radiative transfer, energy balance, hydrologic cycle, atmospheric and oceanic energy transport. Factors controlling climate change. Prerequisite: 301. Offered: Sp.

ATM S 340 Introduction to Thermodynamics and Cloud Processes (5) NW Thermodynamics and hydrostatics. Cloud and precipitation processes with emphasis on the microphysics. Prerequisite: MATH 126 or permission of instructor. Offered: W.

ATM S 350 Atmospheric Data Analysis (3) NW Statistical and other methods employed in atmospheric data analysis. Frequency distributions, sampling theory, elementary time-series, and spectral analysis. Prerequisites: 301. Offered: W.

ATM S 358 Fundamentals of Atmospheric Chemistry (3) NW Review of basic principles of physical chemistry; evolution and chemical composition of

earth's atmosphere; half-life, residence and renewal time; sources, transformation, transport and sinks of gases in the troposphere; atmospheric aerosols; chemical cycles; air pollution; stratospheric chemistry. Prerequisite: CHEM 140. Offered: Sp.

ATM S 370 Atmospheric Structure and Analysis (5) NW Structure and evolution of extratropical cyclones, fronts and convective systems. Surface and upper air analysis techniques. Radar and satellite data. Real-world applications of basic dynamical principles. Introduction to operational products and forecasting. Prerequisite: 301. Offered: W.

ATM S 390 Honors Tutorial in Atmospheric Sciences (* max. 6) Review and discussion of selected problems in atmospheric sciences. Introduction to research methods. Presentation of a research paper. Recommended: MATH 126 and PHYS 123. Offered: AWPSP.

ATM S 406 Geophysics: The Atmosphere (3) NW Phenomena of the lower atmosphere: simple applications of the principles of classical thermodynamics, fluid dynamics, and radiative transfer to the atmospheric hydrological cycle, global energy balance, and atmospheric dynamics and climate. Prerequisite: GPHYS 404 or permission of instructor. Offered: jointly with GPHYS 406; Sp.

ATM S 431 Atmospheric Physics (5) NW Energy transfer processes: solar and atmospheric radiation, turbulence, and boundary layer structure. Applications. Prerequisite: 340 or PHYS 224. Offered: A.

ATM S 441 Atmospheric Motions I (3) NW Basic equations governing atmospheric motions and their elementary applications; circulation and vorticity; dynamics of midlatitude disturbances. Prerequisites: AMATH 353. Offered: A.

ATM S 442 Atmospheric Motions II (5) NW Wave dynamics, numerical prediction, development of midlatitude synoptic systems, and general circulation. Includes laboratory exercises. Prerequisite: 441. Offered: W.

ATM S 451 Instruments and Observations (5) NW Principles of operating instruments for measuring basic atmospheric parameters such as pressure, temperature, humidity, wind, radiation, aerosol concentration, and trace gas concentrations. Concepts of sensitivity, accuracy, representativeness, and time response. Manipulation of output data including digitizing and signal processing. Prerequisites: 302 and 350. Offered: W.

ATM S 452 Weather Forecasting and Advanced Synoptic Meteorology (5) NW Basic forecasting techniques. Application of numerical modeling and statistical approaches. Structure, evolution, and forecasting of convective systems. Radar applications. Diurnal and topographically-forced circulations. Aviation meteorology. Laboratories include extensive practice in forecasting and surface map analysis. Prerequisites: 350, 370, and 442. Offered: Sp.

ATM S 458 Global Atmospheric Chemistry (4) NW Global atmosphere as chemical system. Physical factors and chemical processes. Natural variabilities and anthropogenic change. Cycling of trace substances. Global issues such as climate change, acidic deposition, influences on biosphere. Prerequisites: CHEM 140 and either ATM S 358 or CHEM 352 or 456, or permission of instructor. Offered: jointly with CHEM 458; A.

ATM S 462 Sea-Air Transfer Processes (* max. 6) NW Classroom work and field observations relating to the physical processes occurring at the ocean-atmosphere boundary. Transfer of energy, momentum, and moisture and their effects on small- and large-scale phenomena, including fog formation, convection, modification of air masses. Prerequisite: 442 or permission of instructor. Offered: alternate years; S.

ATM S 480 Air-Quality Modeling (3) NW Evaluation of air-quality models relating air pollution emis-

sions to environmental concentrations. Topics include meteorological dispersion models and various "receptor" models based on chemical "fingerprinting" of sources. Emphasizes current problems. Prerequisite: 458 or CHEM 458 or CIVE 490 or permission of instructor. Offered: jointly with CIVE 480; W.

ATM S 492 Readings in Meteorology or Climatology (*) Credit/no credit only. Prerequisite: permission of instructor. Offered: AWPSP.

Courses for Graduates Only

ATM S 501 Fundamentals of Physical Meteorology (5) Fundamentals of hydrostatics, thermodynamics, radiative transfer with application to planetary atmospheres, cloud physics, and atmospheric chemistry. Offered: A.

ATM S 502 Introduction to Synoptic Meteorology (3) Overview of weather systems; atmospheric observations and data assimilation. Elementary manual and computer-aided synoptic analysis techniques. Interpretation of satellite and ground-based observations. Kinematics. Fronts and frontogenesis; life cycles of extratropical cyclones; related mesoscale phenomena. Numerical weather prediction; interpretation of forecast products. Offered: Sp.

ATM S 505 Introduction to Fluid Dynamics (4) Eulerian equations for mass, motion; Navier-Stokes equation for viscous fluids, Cartesian tensors, stress, strain relations; Kelvin's theorem, vortex dynamics; potential flows, flows with high, low Reynolds numbers; boundary layers, introduction to singular perturbation techniques; water waves; linear instability theory. Prerequisites: AMATH 403 or permission of instructor. Offered: jointly with AMATH 505; A.

ATM S 508 Geochemical Cycles (4) Descriptive, quantitative aspects of earth as biogeochemical system. Study of equilibria, transport processes, chemical kinetics, biological processes; their application to carbon, sulfur, nitrogen, phosphorus, other elemental cycles. Stability of biogeochemical systems; nature of human perturbations of their dynamics. Prerequisites: CHEM 150, 350, MATH 307, 308. Offered: jointly with GPHYS 508; Sp.

ATM S 509 Geophysical Fluid Dynamics I (3) Large-scale dynamics of rotating stratified fluids, introductory fluid mechanics. Observed properties of oceanic, atmospheric flow, thermal-wind balance, velocity spirals. Potential vorticity, instability of large-scale flows, Ekman layers. Gravity, inertia, Rossby waves; ray theory, equatorial waveguide. Action, energy principles. Offered: jointly with OCEAN 512; W.

ATM S 510 Physics of Ice (3) Structure of the water molecule. Crystallographic structures of ice. Electrical, optical, thermal, and mechanical properties of ice. Growth of ice from the vapor and liquid phases. Physical properties of snow. Prerequisite: permission of instructor. Offered: jointly with GPHYS 510; alternate years; W.

ATM S 511 Formation of Snow and Ice Masses (3) Snow and ice climatology. Formation of the ice crystals in clouds. Snow metamorphism. Transfer of radiative, sensible, and latent heat at snow and ice surfaces. Remote sensing of snow and ice. Growth and melt of sea ice. Climatic records from ice. Prerequisite: permission of instructor. Offered: jointly with GPHYS 511; alternate years; A.

ATM S 512 Dynamics of Snow and Ice Masses (3) Rheology of snow and ice. Sliding and processes at glacier beds. Thermal regime and motion of seasonal snow, glaciers, and ice sheets. Avalanches and glacier surges. Deformation and drift of sea ice. Response of natural ice masses to change in climate. Prerequisite: permission of instructor. Offered: jointly with GPHYS 512; alternate years; Sp.

ATM S 513 Structural Glaciology (3) Physical and chemical processes of snow stratigraphy and meta-

morphism. Interpretation of ice sheet stratigraphy in terms of paleoenvironment. Dynamic metamorphism from ice flow. Structures formed at freezing interfaces. Structure of river, lake, and sea ice. Relationship between structures and bulk physical properties. Prerequisite: permission of instructor. Offered: jointly with GPHYS 513; alternate years; W.

ATM S 514 Ice and Climate Modeling (3) Principles of global climate modeling. Modeling seasonal cycles of snow cover and sea ice. Ice-sheet mass balance and flow. Solar radiation anomalies due to changes in earth's orbit. Climate/ice-sheet models of Pleistocene ice ages. Prerequisite: permission of instructor. Offered: jointly with GPHYS 514; alternate years; A.

ATM S 520 Atmospheric Sciences Colloquium (1, max. 15) Seminars on current research in advanced topics related to atmospheric sciences, conducted by faculty and visiting professors/scientists. Includes presentation of doctoral dissertations by department graduate students. For Atmospheric Sciences graduate students only. Credit/no credit only. Prerequisite: permission of department. Offered: AWSp.

ATM S 521 Seminar in Atmospheric Dynamics (*) Directed at current research in the subject. For advanced students. Credit/no credit only. Prerequisite: permission of instructor. Offered: AWSp.

ATM S 523 Seminar in Clouds and Precipitation (*) Directed at current research in the subject. For advanced students. Credit/no credit only. Prerequisite: permission of instructor. Offered: ASp.

ATM S 524 Seminar in Energy Transfer and Remote Sensing (*) Directed at current research in the subject. For advanced students. Credit/no credit only. Prerequisite: permission of instructor. Offered: AWSp.

ATM S 525 Seminar Topics in Atmospheric Chemistry (1-3, max. 6) Seminar for atmospheric scientists, chemists, and engineers in problems associated with the chemical composition of the atmosphere. Topics range from the natural system to urban pollution and global atmospheric change. Faculty lectures and student participation. Prerequisite: 301 or permission of instructor. Offered: jointly with CEWA 525; W.

ATM S 532 Atmospheric Radiation: Shortwave (3) Principles of radiative transfer in planetary atmospheres with emphasis on single and multiple scattering of visible and infrared radiation. Applications to atmosphere and surface energy balance and remote sensing. Prerequisite: PHYS 323 or permission of instructor. Offered: jointly with GPHYS 532; alternate years; W.

ATM S 533 Atmospheric Radiation: Longwave (3) Principles of radiative energy exchange in planetary atmospheres with emphasis on emission and absorption of infrared and microwave radiation. Applications to atmospheric and surface energy balance and remote sensing. Prerequisite: PHYS 225 or permission of instructor. Offered: jointly with GPHYS 533; Sp.

ATM S 534 Remote Sensing of the Atmosphere and Climate System (3) Satellite systems for sensing the atmosphere and climate system. Recovery of atmospheric and surface information from satellite radiance measurements. Applications to research. Prerequisites: 532 or 533. Offered: jointly with GPHYS 534; alternate years; W.

ATM S 535 Cloud Microphysics and Dynamics (3) Basic concepts of cloud microphysics, water continuity in clouds, cloud dynamics, and cloud models. Prerequisite: 501 or permission of instructor. Offered: jointly with GPHYS 535; W.

ATM S 536 Mesoscale Storm Structure and Dynamics (3) Techniques of observing storm structure and dynamics by radar and aircraft, observed structures of precipitating cloud systems, comparison of observed structures with cloud models. Prerequisite: 535 or GPHYS 535. Offered: Sp.

ATM S 542 Synoptic and Mesoscale Dynamics (3) Quasi-geostrophic theory, baroclinic instability, symmetric instability, tropical disturbances, frontogenesis, orographic disturbances, convective storms. Prerequisite: 509 or OCEAN 512 and AMATH 402 or equivalents. Offered: Sp.

ATM S 545 General Circulation of Atmosphere (3) Requirements of the global angular momentum, heat, mass, and energy budgets upon atmospheric motions as deduced from observations. Study of the physical processes through which these budgets are satisfied. Prerequisite: 509 or OCEAN 512, or permission of instructor. Offered: A.

ATM S 547 Atmospheric Turbulence (3) Turbulent flux of heat, momentum, and moisture in the layer of the atmosphere next to the earth; Richardson's stability criterion; free convection. Prerequisites: 505 or AMATH 505 or OCEAN 511 or permission of instructor. Offered: alternate years; Sp.

ATM S 551 Atmospheric Structure and Analysis I: Synoptic Scale Systems (4) Extratropical cyclones and cyclogenesis. Jet streams. Upper waves in the westerlies. Diagnosis of vertical motions. Fronts and frontogenesis. Prerequisite: 502, 509 or OCEAN 512. Offered: alternate years; A.

ATM S 552 Objective Analysis (3) Review of objective analysis techniques commonly applied to atmospheric problems; examples from the meteorological literature and class projects. Superposed epoch analysis, cross-spectrum analysis, filtering, eigenvector analysis, optimum interpolation techniques. Prerequisite: FORTRAN programming. Offered: alternate years; W.

ATM S 553 Atmospheric Structure and Analysis II: Non-Convective Mesoscale Circulation (3) Thermally forced circulation systems, including sea/land breezes and mountain/valley winds. Topographic deflection, channeling and blocking in mesoscale flows. Analysis and forecasting of local mesoscale phenomena. Offered: alternate years; W.

ATM S 555 Planetary Atmospheres (3) Problems of origin, evolution, and structure of planetary atmospheres, emphasizing elements common to all; roles of radiation, chemistry, and dynamical processes; new results on the atmospheres of Venus, Mars, Jupiter, and other solar system objects in the context of comparative planetology. Offered: jointly with ASTR/GPHYS 555; alternate years.

ATM S 556 Planetary-Scale Dynamics (3) Zonally symmetric circulations, planetary waves, equatorial waves, dynamics of the middle atmosphere, trace constituent transport, nonlinear aspects of atmospheric flows. Prerequisites: 542 or permission of instructor. Offered: alternate years; Sp.

ATM S 558 Atmospheric Chemistry (3) Photochemistry of urban, rural, and marine tropospheric air, and of the natural and perturbed ozone in the middle atmosphere. Unity of the chemistries in these apparently different regimes. Prerequisite: 458 or 501 or CHEM 457 or permission of instructor. Offered: alternate years; Sp.

ATM S 564 Atmospheric Aerosol and Multiphase Atmospheric Chemistry (3) Physics and chemistry of particles and droplets in the atmosphere. Statistics of size distributions, mechanics, optics, and physical chemistry of atmospheric aerosols. Brownian motion, sedimentation, impaction, condensation, and hydroscopic growth. Prerequisite: permission of instructor. Offered: alternate years; W.

ATM S 571 Advanced Physical Climatology (3) Physical processes that determine the climate of Earth and its past and future changes. Greenhouse effect. Climate modeling. Radiative and dynamical feedback processes. Orbital parameter theory. Critical analysis of climate change predictions. Prerequisite: permission of instructor. Offered: A.

ATM S 575 Large Scale Dynamics of the Tropical Atmosphere (3) Observations and underlying dynamics of large-scale tropical circulations. Factors that determine regions of large-scale persistent precipitation in the tropics, thermal forcing of atmospheric circulations by these regions, and temporal variability of the forcing and response. Credit/no credit only. Prerequisites: 509 or OCEAN 512, 542. Offered: alternate years; W.

ATM S 581 Numerical Modeling of Atmospheric Flows I (3) Numerical methods for initial value problems of atmospheric science and fluid dynamics. Finite difference methods, spectral and pseudo-spectral methods, finite element methods. Stability, accuracy, numerical dispersion and numerical dissipation. Computer models constructed to illustrate behavior of each method. Prerequisite: familiarity with partial differential equations and FORTRAN.

ATM S 582 Numerical Modeling of Atmospheric Flows II (3) Topics of current interest including: efficient time differencing, semi-implicit and multiple time-step techniques. Semi-lagrangian schemes. Treatment of poorly resolved gradients. Flux-corrected transport. Positive definite advection schemes. Aliasing error and nonlinear instability. Wave permeable boundary conditions. Credit/no credit only. Prerequisite: 581. Offered: alternate years; Sp.

ATM S 591 Special Topics (1-4, max. 9) Lecture series on topics of major importance in the atmospheric sciences. Prerequisite: permission of instructor. Offered: AWSp.

ATM S 600 Independent Study or Research (*) Credit/no credit only. Offered: AWSp.

ATM S 700 Master's Thesis (*) Offered: AWSp.

ATM S 800 Doctoral Dissertation (*) Offered: AWSp.

Biochemistry

109 Bagley

Biochemistry is the study of the living organism at the molecular level. It draws on the techniques of analytical, organic, inorganic, and physical chemistry in determining the molecular basis of vital processes. Since the study of any chemistry-based field requires an understanding of mathematics and physics, the Bachelor of Science degree in biochemistry requires introductory courses in mathematics, physics, chemistry, and biology as well as intermediate-level courses in chemistry. These courses prepare the student for junior and senior studies in biochemistry, molecular genetics, and molecular biology. Since the subject requires a very broad scientific foundation, the program requires 200 credits. At the advanced level the student has a choice of a wide range of courses in a variety of science departments.

Undergraduate Program

Adviser
Lari Stone
109C Bagley
email: stone@chem.washington.edu
(206) 543-9343 or 1-800-869-2436

Bachelor of Science

Admission Requirements: Recommended high school preparation includes four years of college preparatory mathematics, one year of physics, one year of chemistry, and one year of biology.

Major Requirements: MATH 124, 125, 126 (or 134, 135, 136); PHYS 114, 115, 116 (121/131, 122/132, 123/133 recommended); CHEM 145, 155, 165 (or 140, 141, 150, 151, 160, 161); CHEM 335, 336, 337, 346, 347 (or

237, 238, 239, 241, 242); CHEM 455, 456, 457 (or 452, 455); BIOL 201, 202; BIOC 440, 441, 442, 426 (minimum GPA of 2.20 in 440, 441, 442); GENET 371 or 372; 11 credits from among the following: MATH 307 and either 205 or 308 (not if 134, 135, 136 taken); AMATH 351, 353 (credit not granted for both courses in the following combinations: MATH 205/308; MATH 307/AMATH 351; MATH 205/AMATH 353; MATH 308/AMATH 353); BIOL 203, 401, 402; MICROM 402, 410; CHEM 312, 317, 321, 410, 414, 416, 419, 426, 427, 429, 433, 435, 436, 437, 460, 461, 462, 463, 464, 465, 471; GENET 455; ZOOL 455, 456; up to 9 credits of advanced-level undergraduate research. For all chemistry, biochemistry, and biology courses required by the major program, a minimum grade of 1.7 and a GPA of 2.80. For graduation 200 credits are required with a cumulative GPA of 2.80 or better.

For faculty listing see *Chemistry in the College of Arts and Sciences* and *Biochemistry in the School of Medicine*. For course descriptions, see the appropriate department.

Biology

318 Hitchcock

Undergraduate Program

Advisers
Joyce Fagel,
Peg Powell,
Clay Swennen
318 Hitchcock

The undergraduate program in biology offers two alternative interdisciplinary tracks leading to a baccalaureate degree. The emphasis of Track 1 is on cell and molecular biology while the emphasis of Track 2 is on ecology, evolution, and conservation biology. Track 1 is particularly well-suited for students who wish to pursue graduate studies or immediate entry-level employment in genetics, biochemistry, microbiology, cell biology, or developmental biology, as well as for candidates for professional schools such as medicine. Track 2 is designed for students who wish to pursue graduate studies or immediate employment in ecology, evolution, conservation biology, or mathematical biology, as well as for students preparing themselves for related areas of law or public policy.

A number of other academic units offer degrees in biological fields or with strong biological orientations. These include, but are not limited to, the Departments of Biochemistry, Botany, Microbiology, Psychology, and Zoology; and the Colleges of Forest Resources and of Ocean and Fishery Sciences.

Bachelor of Science

Major Requirements: For both tracks the following basic course work is required: one year of mathematics (calculus and/or statistics); four to six quarters of chemistry covering general and organic chemistry; two quarters of physics; and one year of introductory biology. Track 1 requires one quarter of physical chemistry.

The two tracks diverge substantially in their requirements for advanced course work. Track 1 requires GENET 371 or 372; and either option 1, BIOC 440, 441, 442 or option 2, BIOC 405, 406 and either BIOL 401 or BIOC 442. Track 2 requires BIOL 454, 472, and 476. Additional upper-division work in both tracks is selected from course lists designed to ensure both breadth and depth of coverage.

Because of the differing specific requirements and options for each track, it is extremely important for students to work closely with the program advisers.

Faculty

Director

John M. Palka

Professor

Palka, John M. * 1969; PhD, 1965, University of California (Los Angeles); neurophysiology, sensory physiology, developmental neurobiology.

Senior Lecturer

Nicotri, Mary E. 1977; PhD, 1974, University of Washington; marine ecology, evolution and introductory biology teaching.

Lecturers

Mehary, Tekie 1988; MSc, 1976, Washington State University; PhD, 1981, University of Washington; applied entomology and environmental health.

O'Connor, Eileen 1975; MS, 1976, University of Washington; ecology and evolution.

Paul, Anne S. 1980; BS, 1980, MA, 1993, University of Washington; molecular biology.

Rudkin, Alison H. 1974; MS, 1973, University of Washington; physiology and development.

Russell, Millie L. 1974; MS, 1979, EdD, 1988, University of Washington; health science careers.

Waland, Susan D. 1990; PhD, 1969, University of California (Berkeley); algology and plant physiology.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

The courses in biology listed below are administered by several departments. Other courses in biology are listed under such headings as *Biochemistry, Biological Structure, Botany, Microbiology, and Zoology*.

BIOL 100 Introductory Biology (5) NW Develops an awareness of science by studying basic biological principles and their application to problems of humans and society. Autumn Quarter concentrates on the organism; Winter on the cell; and Spring on ecology and the environment. For nonscience majors only. Credit allowed for only three of the following: 100, 150, 151, 152. Offered: AWSpS.

BIOL 101-102 General Biology (5-5) NW Living systems viewed from the subcellular to the community level, emphasizing the diversity, functioning, and interaction of whole organisms. Topics covered include: cell structure and function, energy, genetics, animal physiology and development in 101; plant and animal diversity, plant structure and function, general ecology and evolution in 102. Emphasizes the position of humans in the biological world. For nonmajors and majors in biology-related fields who need a thorough two-quarter introduction to biology. Prerequisite: 101 for 102. Offered: A-W.

BIOL 103 Introduction to Biology (5) NW Mehary Basic biological concepts within the context of human biology. For students in the Educational Opportunity Program. Cannot be taken for credit if 100 previously taken. Credit/no credit only. Prerequisite: permission of instructor. Offered: ASp.

BIOL 104 Biology for Elementary School Teachers (5) NW Butner Basic concepts of biology, with emphasis on background needed for confident use of the new science curriculum materials in the elementary school. Prerequisite: permission of instructor. Offered: AW.

BIOL 110 Elementary Biology for Health Professions I (2) NW Russell Elementary biomedical concepts. For Equal Opportunity Program students only. Credit/no credit only. Prerequisite: permission of instructor. Offered: A.

BIOL 111 Elementary Biology for Health Professions II (2) NW Russell Elementary human anatomy and physiology, including selected areas in laboratory medicine. For Equal Opportunity Program students only. Credit/no credit only. Prerequisite: 110. Offered: W.

BIOL 112 Elementary Biology for Health Professions III (1-4) NW Russell Field experience in a health profession. For Equal Opportunity Program students only. Credit/no credit only. Prerequisite: 111. Offered: Sp.

BIOL 113 Biology Tutorial (1-3, max. 6) NW Mehary Independent study. Topics related to material taken in ZOOL 118, BIOL 201 and BIOL 202. For Equal Opportunity Program students only. Credit/no credit only. Prerequisite: permission of instructor. Offered: AWSp

BIOL 150 Biology: The Organism (5) NW Fundamentals of living systems, with emphasis on organisms. Selected organisms, both animal and plant, examined in detail to explore how structure is related to function and how the whole is integrated into a successful individual. Open only to nonscience majors who want more than one quarter of introductory biology. Offered: A.

BIOL 151 Biology: The Cell (5) NW Fundamentals of living systems, with emphasis on cells. Cellular and molecular biology studied through concern for human health ecology, including AIDS as a virus, DNA, and cellular replication. Open only to nonscience majors who want more than one quarter of introductory biology. Offered: W.

BIOL 152 Biology: Ecology and Evolution of Organisms (5) NW Fundamentals of living systems, with emphasis on the ecology and evolution of organisms. Considers diversity of organisms and the ways they are adapted to live in specific habitats. Studies forces which direct the evolution of organisms. Open only to nonscience majors who want more than one quarter of introductory biology. Offered: Sp.

BIOL 201, 202, 203 Introductory Biology (5, 5, 5) NW Introduction to biology for students intending to take advanced courses and preprofessional programs. Emphasis on features common to all living things: molecular phenomena, cell structure, metabolism, energetics, genetic basis of inheritance in 201; animal structure, function, and development in 202; plant structure and function, general ecology, and evolution in 203. Prerequisites: CHEM 140, 150, and 160; 201 for 202, 202 for 203. Offered: AWSp, AWSpS, ASpS.

BIOL 206 Laboratory in Environmental Problems (5) NW Leopold Processes and structure of ecosystems and conflicting uses made of these environments. Role and application of science. Field trips to natural and human-modified ecosystems; weekend field trips required. Offered: jointly with BOTANY 206; A.

BIOL 213 Scientific Illustration (3) VLPA/NW Practical course designed to acquaint the science student with the techniques of illustrating. Accurate and selective interpretation of shape, texture, and consistency of biological materials, working in black and white and using a variety of illustration techniques. Students may choose objects of special interest to them. Offered: through University Extension; W.

BIOL 214 Scientific Illustration (3) VLPA/NW Continuation of 213. Further training techniques: tone, color, and working from the live animal. Exploration of specifications for ultimate use in projection or print. Offered: through University Extension; Sp.

BIOL 313, 314, 315 Advanced Scientific Illustration (3, 3, 3) VLPANW Sweeney Intensive treatment of techniques. 313: five continuous-tone techniques, lighting, form, and texture rendition; 314: seven black-and-white techniques, reproduction, typesetting, pasteup, and layout; 315: color illustration techniques. Each includes historical perspective on the techniques under study and critique of published material. Prerequisites: 213, 214, and introductory biology. Offered: through University Extension.

BIOL 333 Plant Communities: Resilience and Restoration (5) NW Leopold Ecological impacts by humans on native plant communities. Effects of grazing, timber removal, habitat draining and filling, fire control, application of chemicals. Potential for ecological restoration of plant communities. Three required weekend field trips. Prerequisite: 113 and BIOL 102 or BIOL 203 or equivalent. Offered: jointly with BOTANY/ESC 333; Sp.

BIOL 401 Cell Biology (5) NW Bakken, Hille, Wakimoto, Wright Selected topics in molecular cell biology. Strong emphasis on understanding original experiments that describe the functions of the cell. Prerequisites: 201, 202. Recommended: one upper-division course in related area.

BIOL 402 Cell Biology Laboratory (3) NW Shellenbarger Practice in modern methods (restriction enzyme digestion, blotting, hybridization, immunochemistry, density gradient centrifugation, electrophoresis) and other methods currently used to study plant and animal cells, nucleic acids, and proteins. Includes practice in scientific style writing. Prerequisite: 401 which may be taken concurrently.

BIOL 454 Evolutionary Mechanisms (4) NW Kingsolver, Schemske Evolutionary change as determined by mutation, recombination, selection. Effects of the genetic system, isolating mechanisms, hybridization, polyploidy on speciation. Examples of microevolutionary and macroevolutionary changes from plant and animal kingdoms. For advanced undergraduate and graduate students in biological sciences. Prerequisites: 201, 202, 203 or 101-102 or permission of instructor.

BIOL 460 Biology of Eukaryotic Microorganisms (5) NW Whisler Introduction to comparative biology of the algae, fungi, and protozoa. Emphasis on the life history, physiology, and structure of protists most commonly used in contemporary biological research. Prerequisites: 201, 202, 203 or 101-102 or introductory microbiology. Offered: alternate years; Sp.

BIOL 472 Principles of Ecology (5) NW Kareiva, Odell, Orians, Paine Population biology, interactions between species in biological communities, relationship of community to environment, physiological ecology, principles of natural selection. Prerequisites: 15 credits in biological sciences and upper-division standing or permission of instructor. Offered: W.

BIOL 473 Limnology (3) NW Biological, physical, and chemical features of lakes and other inland waters. Prerequisites: 15 credits in biological sciences, 10 credits in college chemistry, and upper-division standing, or permission of instructor.

BIOL 476 Conservation Biology (5) NW Boersma, Orians Explores biological, managerial, economic, and ethical concepts affecting survival of species. Applications of ecology, biogeography, population genetics, and social sciences for the preservation of species in the face of widespread global habitat modification, destruction, and other human activities. Prerequisite: 472 or ENV S 204 or equivalent.

BIOL 491 Special Topics in Biological Science for Teachers (3-9) NW Study of selected areas of biology. Designed to enhance the skills and background of K-12 teachers. Credit/no credit only. Prerequisite: teaching experience or permission of instructor.

BIOL 492 The Teaching of Biology (2) Basic course in the teaching of biology in the secondary school. Designed to help preservice teachers identify useful laboratory techniques, materials, and content for the teaching of pre-college biology. Special attention to current issues in biology education. Required for biology student in Teacher Certification Program. Prerequisite: admission to Teacher Certification Program or permission of instructor.

BIOL 498 Peer Teaching Assistants in Biology (1-5, max. 10) Direct experience in the classroom, typically teaching a lab section of BIOL 100. Peer Teaching Assistants attend lectures and weekly preparation meetings and gain in-depth background on the subject material as well as training in teaching techniques and approaches. Credit/no credit only. Prerequisites: 201, 202, 203 or 101-102, several upper division courses, and permission of instructor. Offered: AWSp.

BIOL 499 Independent Studies in Biology (1-5, max. 15) Individual laboratory or library explorations of selected topics. Prerequisite: permission of instructor.

Course for Graduates Only

BIOL 501 Advanced Cytology (1-5, max. 5) Detailed study of the structure and function of the cell. Prerequisite: permission of instructor.

BIOL 508 Cell Biology (3, max. 6) Four to five topics of current interest in cell biology selected by the enrollees. Prerequisite: permission of instructor.

BIOL 520 Computers in Biology Instruction (2) Palka Review and evaluation of software for undergraduate instruction in biology. Discussions on usefulness of different types of programs, e.g., simulations and interactive tutorials. Generation of new ideas and approaches for increasing use of computers in biology instruction. Credit/no credit. Credit/no credit only. Prerequisite: graduate student in biological or biomedical sciences or permission of instructor.

BIOL 578 Megareserve Management (5) Field course held on Olympic Peninsula, Washington, and Tempisque Basin, Costa Rica, in alternate years. Provides graduate students with practical, hands-on experience in megareserve design and management, including: developing objectives, establishing boundaries, determining compatibility of proposed uses, funding and political feasibility. Prerequisite: 476.

BIOL 577 Problem Solving in Conservation Biology (5) In-depth analyses of current issues in conservation biology and sustainable development. Emphasis on multidisciplinary efforts to address specific problems in both temperate and tropical regions.

BIOL 578 Species Preservation, Captive Propagation, and Reintroductions (5) Offered with Woodland Park Zoo. Explores topics relevant to management of endangered species through lectures, seminars, and workshops. Focuses on the role of zoos in contributing to species survival plans; addresses techniques for decision analysis and conflict assessment! Captive propagation, reintroductions, translocation efforts evaluated.

BIOL 581 Biology of Drosophila Seminar (1, max. 12) Weekly presentation by participants of classical literature, current literature, and research in the molecular biology, developmental biology, neurobiology, and genetics of *Drosophila*. Prerequisite: permission of instructor. Offered: AWSp.

BIOL 585 Methods and Problems in Development (3) Schubiger, Cornal, Kimelman Special topics in development. Integrates classical and current approaches. Developmental genetics, experimental embryology, molecular mechanisms of developmental regulation, and gene function in cell determination and differentiation in developing systems. Prerequisites: 455 or equivalent.

BIOL 586 Analysis of Development (3, max. 6) Analysis of structural, physiological, and molecular levels of developmental processes, including gametogenesis, fertilization, cell and tissue movements, induction, and cytodifferentiation. Prerequisites: ZOOL 456 and BIOC 442 or permission of instructor.

BIOL 587 Analysis of Development Laboratory (1-5) Series of intensive workshops in developmental biology, each extending over three to five days. Each is based on problems under study in the laboratory of the instructors involved, using materials, methods, and approaches characteristic of that laboratory. Credit/no credit only. Prerequisite: permission of instructor.

Botany

430 Hitchcock

Botany is concerned with the structure, ecology, physiology, classification, genetics, and evolution of plants, algae, fungi, and related organisms, with emphasis on organismal as well as cellular and molecular biology. Special courses and programs in botany of the Pacific Northwest are shared with related departments.

Undergraduate Program

Advisers

318 Hitchcock

Program Information

430 Hitchcock

The Department of Botany offers two undergraduate degrees. The Bachelor of Arts degree is designed for students who wish to obtain a broad training in the biology of plants and plant-like organisms, but who do not plan to continue with further graduate training in the biological sciences. The Bachelor of Science degree includes a more extensive training in mathematics and chemistry and is designed for students who are planning to continue with graduate training in botany or other areas of biology.

Bachelor of Arts

Major Requirements: Minimum of 65 credits as follows: BIOL 101-102 and GENET 371 (or BIOL 201, 202, 203); CHEM 120 and 220 or CHEM 140, 150, 160; BOTANY 113, 354, 371, 372, 441, and one of the following: BOTANY 446 or BOTANY 461 or BIOL 460. Minimum of 15 credits of upper-division courses (excluding courses without prerequisites) in botany, zoology, microbiology, genetics, biology, and certain courses in forest resources, oceanography, and fisheries.

Bachelor of Science

Major Requirements: Minimum of 87 credits as follows: BIOL 101-102 and GENET 371 (or BIOL 201, 202, 203 and GENET 371 or 372). CHEM 120, 220, 221 (or CHEM 140, 141, 150, 160, and either CHEM 223, 224 or 237, 238, 239). One of the following sequences: MATH 124, 125; Q SCI 291, 292; or Q SCI 381, 482; or one quarter of calculus and one quarter of statistics. BOTANY 113, 354, 371, 372, 428, 441; BIOL 454, and one of the following: BOTANY 446 or BOTANY 461 or BIOL 460. Minimum of 15 credits of upper-division courses (excluding courses without prerequisites) in botany, zoology, microbiology, genetics, biology, and certain courses in forest resources, oceanography, and fisheries.

Graduate Program

The Department of Botany offers programs of graduate study leading to the Master of Science and Doctor of Philosophy degrees. Each program of study is planned individually and takes into consideration the background and interests of the student.

Research Facilities

Special departmental facilities include a herbarium containing vascular plants, bryophytes, algae and fungi; greenhouse, algae and fungal culture collections, growth chambers and growing rooms, instruments for molecular analysis, and a fully-equipped scanning electron microscope center. The Friday Harbor Laboratories on San Juan Island offer opportunities for the study of marine botany, and the great variety of habitats in the Pacific Northwest provide excellent opportunities for field investigations.

Special Requirements

A prospective graduate student is expected to have had the equivalent of an undergraduate major in biological science, with training in chemistry (at least through organic chemistry), general botany, plant physiology, and genetics. Calculus and/or statistics is recommended.

Financial Aid

Teaching assistantships are awarded to selected applicants in March of each year. Students should inquire about other sources of support.

Correspondence and Information

Graduate Program Coordinator
430 Hitchcock
Department of Botany, Box 355325

Faculty

Chair

Joseph F. Ammirati

Professors

Ammirati, Joseph F. * 1979; MA, 1967, San Francisco State; PhD, 1972, University of Michigan; mycology, taxonomy and ecology of fungi.

Bendich, Arnold J. * 1970; PhD, 1969, University of Washington; mitochondrial and chloroplast genome structure.

Bliss, Lawrence C. * 1978, (Emeritus); PhD, 1956, Duke University; physiological plant ecology and ecosystem development and function, arctic, alpine environments.

Cattolico, Rose A. * 1975; PhD, 1973, State Univ of New York (Stony Brook); plastid replication, nucleic acid biochemistry in synchronized unicellular algae.

Cleland, Robert E. * 1964; PhD, 1957, California Institute of Technology; physiology, plant hormones, cell wall.

del Moral, Roger * 1968; PhD, 1968, University of California (Santa Barbara); plant ecology, community structure, succession.

Hall, Benjamin D. * 1963; MA, 1956, PhD, 1959, Harvard University; molecular genetics and evolution of plants and lower eukaryotes.

Halperin, Walter * 1968, (Emeritus); PhD, 1965, University of Connecticut; plant physiology, developmental anatomy, embryogenesis.

Haskins, Edward F. * 1966, (Emeritus); PhD, 1965, University of Minnesota; cytology, ultrastructure of microorganisms, especially slime molds.

Kruckeberg, Arthur R. * 1950, (Emeritus); PhD, 1950, University of California (Berkeley); evolution, flora of PNW, edaphic ecology, conservation.

Leopold, Estella B. * 1976; PhD, 1955, Yale University; paleoecology, pollen and seed analysis, late Cenozoic environment.

Mease, Bastiaan J. D. * 1952, (Emeritus); Dr., 1943, University of Leyden (Netherlands); plant physiology, algal physiology, metabolism, plant biochemistry.

Schemske, Douglas W. * 1989; PhD, 1977, University of Illinois; evolutionary biology, plant population biology and coevolution.

Tsukada, Matsuo * 1969; PhD, 1961, Osaka City University (Japan); interpretation of Quaternary events from palynological and kindred data.

Waaland, J. Robert * 1969; PhD, 1969, University of California (Berkeley); biology of marine algae.

Walker, Richard B. * 1948, (Emeritus); PhD, 1948, University of California (Berkeley); plant physiology, mineral nutrition, water relations.

Whisler, Howard C. * 1963; PhD, 1961, University of California (Berkeley); mycology, aquatic fungi, slime-molds and phycocomycetes, development.

Associate Professors

Comai, Luca * 1989; PhD, 1980, University of California (Davis); chromatin and gene regulation, polyploidy, axil development.

Van Volkenburgh, Elizabeth * 1987; PhD, 1980, University of Washington; leaf growth and development, photobiology and electrophysiology.

Assistant Professor

Olmstead, Richard G. 1996; PhD, 1988, University of Washington; plant molecular systematics/plant phylogeny and macroevolution.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

BOTANY 110 Introductory Plant Biology (5) NW Ammirati, Bliss, del Moral, Haskins, Waaland Basic concepts in plant biology for nonmajors, with emphasis on plant diversity and how plants grow and reproduce. Modern ideas concerning biotechnology, ecology, agriculture, medicine, practical gardening, and conservation and environmental issues discussed. Laboratories include greenhouse studies. Offered: AWSp.

BOTANY 113 Plant Identification and Classification (5) NW Olmstead Plant classification and diversity of seed plants; field study and laboratory identification of the common plant families and the conspicuous flora of western and central Washington. Two full-day field trips. Offered: SpS.

BOTANY 206 Laboratory in Environmental Problems (5) NW Leopold Processes and structure of ecosystems and conflicting uses made of these environments. Role and application of science. Field trips to natural and human-modified ecosystems; weekend field trips required. Offered: jointly with BIOL 206; A.

BOTANY 331 Landscape Plant Recognition (3) NW Hamilton, Tsukada Field recognition of important groups of woody and herbaceous landscape plants, emphasizing diversity at the genus and family levels. Cultivated plant nomenclature. Plant descriptive characters evident in the field with eye and hand lens. Hardiness and landscape applications. Recommended: 113. Offered: jointly with UHF 331; SpS.

BOTANY 333 Plant Communities: Resilience and Restoration (5) NW Leopold Ecological impacts by humans on native plant communities. Effects of grazing, timber removal, habitat draining and filling, fire control, application of chemicals. Potential for ecological restoration of plant communities. Three required weekend field trips. Prerequisite: 113 and BIOL 102 or BIOL 203 or equivalent. Offered: jointly with BIOL/ESC 333; Sp.

BOTANY 350 Introduction to Plant Geography (4) NW Tsukada Patterns of world vegetation distributions; the relationships between vegetation and climate; introduction to general theories of plant distribu-

tion. Emphasis on the affinities within vegetation in different parts of the world. Offered: W.

BOTANY 354 Introduction to Plant Ecology (5) NW del Moral Basic concepts of plant ecology, including studies of the environment, plant-environment interactions, populations, communities, and ecosystems. Laboratory includes one weekend field trip, laboratory and greenhouse experiments, and an introduction to ecological problem solving. Prerequisite: ten credits of biological sciences or permission of instructor. Offered: Sp.

BOTANY 371 Elementary Plant Physiology (3) NW Cleland, Van Volkenburgh Nutrition, assimilation, transport, growth, photosynthesis, and cellular respiration in plants. Prerequisite: BIOL 203 or equivalent or permission of instructor. Offered: W.

BOTANY 372 Plant Physiology Laboratory (2) NW Cleland, Van Volkenburgh Laboratory experiments on the growth, nutrition, and metabolism of plants. Prerequisite: 371 which may be taken concurrently. Offered: W.

BOTANY 380 Economic Botany (3) NW Tsukada Plants useful or harmful to man; their taxonomic and morphological characteristics and chemical constituents; history, distribution, production, usage, and roles in prehistoric and modern cultures and civilization. Prerequisite: 110 or 113 or 10 credits in biological sciences. Offered: even years; A.

BOTANY 426 Plant Genetic Engineering (2) NW Comai Theory, strategy, and methods of genetic engineering, focusing on applications to plant biology. Includes the isolation, characterization, and cloning of nucleic acids, the use of bacterial and plant vectors, and the introduction and expression of genes in plants. Prerequisites: concurrent registration in 427 and permission of instructor. Offered: on demand; W.

BOTANY 427 Plant Genetic Engineering Laboratory (4) NW Comai Methods and techniques in plant genetic engineering, with applications to plant biology. Emphasis on laboratory procedures and experiments. Prerequisites: concurrent registration in 426 and permission of instructor. Offered: on demand; W.

BOTANY 428 Molecular and Cellular Biology of Plants (3) NW Bendich, Cattolico, Comai Structure and function of the nucleus, the organelles, and their genomes. Review of the techniques used in cellular and molecular biology such as tissue culture, cell fractionation, nucleic acid characterization, genetic engineering, and genome mapping. Offered: W.

BOTANY 429 Plant Nuclear and Cytoplasmic Genetics (3) NW Bendich, Comai Covers genetic aspects specific to plants and algae, including chromosome structure, genome mapping, transposon biology, genes for floral and vegetative development, genetic engineering, ploidy levels, and cytoplasmic genetics. Prerequisite: BIOL 101 or 203, and GENET 371 or 372. Offered: Sp.

BOTANY 441 Morphology and Anatomy of Land Plants (5) NW Halperin Comparative morphology and anatomy of land plants. Derivation of morphological structures and basis for current classification schemes examined using living and fossil organisms. Laboratories emphasize live plants native to the Pacific Northwest. Prerequisite: ten credits of biological sciences (must include some plant science) or permission of instructor. Offered: A.

BOTANY 443 Origins of Our Modern Floras (5) NW Leopold Evolution and biogeographic development of modern forest taxa and associations. Late Cenozoic forests (last 60 million years) of western North American environments, emphasizing geologic and climatic shifts that have shaped temperate and tropical vegetation. Three required weekend field trips. Prerequisite: 113 and BIOL 102 or 203 or equivalent. Recommended 354. Offered: A.

BOTANY 445 Marine Botany (8) NW Survey of plants represented in marine environments; natural history; ecology, distribution, habitat, adaptation, and trophic interrelationships. Prerequisites: appropriate credits in biological sciences, generally BIOL 101-102 or 201, 202, 203; concurrent registration in ZOOL 430; and permission of the Director of Friday Harbor Laboratories. Offered: at Friday Harbor Laboratories. Sp.

BOTANY 446 Phycology (5) NW *Cattolico, Waaland* Study of major algal groups emphasizing form, function, reproduction, and distribution. Topics include evolution, phylogeny, and classification. Economically useful and ecologically important algae emphasized. Prerequisite: ten credits of biological science or permission of instructor. Offered: Sp.

BOTANY 448 Marine Algal Ecology (3) NW *Waaland* Marine environment in relation to requirements for algal life. Intertidal, subtidal, geographical, and seasonal distribution of marine algae. Functional aspects of algal form, structure, productivity, and energy economy of marine algal communities. Algal utilization and aquaculture. Prerequisite: 445 or 446 or permission of instructor. Offered: on demand.

BOTANY 455 Vegetation of Western Washington (5) NW *del Moral* Vegetation of western Washington, including mature, seral, and weedy vegetation. Recognition of landscape patterns, sight identification of common and indicator species, classification of major community types, and uses of native species in landscape design. Two weekend field trips required. Recommended: 113 or 354 or L ARCH 463. Offered: odd years; A.

BOTANY 456 Plant Community Ecology (5) NW *del Moral* Development of plant community theory; theory of vegetation structure and typal identification; numerical methods for vegetation description and pattern analysis; gradient analysis; competition and allelopathy in complex systems; vegetation dynamics; niche theory. Laboratory emphasizes sampling design and field and computer methods. Two weekend field trips required. Prerequisite: 354 or permission of instructor. Offered: even years; A.

BOTANY 458 Alpine Plant Ecology (5) NW Structure of plant communities in alpine regions of the Pacific Northwest. Characteristics of physical environment which influence species adaptation and distribution. Influence, impact of humans and criteria for preservation and/or management of alpine areas. Three weekend field trips required. Prerequisite: 10 credits in biological sciences or permission of instructor. Offered: S.

BOTANY 461 General Mycology (5) NW *Ammirati, Whisler* General survey of the fungi with emphasis on life cycles, structure, physiology, economic importance. Prerequisite: 10 credits in biological science or permission of instructor. Offered: A.

BOTANY 485 Microscopy and Photography for Biologists (3) NW *Waaland* Principles and practice of light microscopy, photomicrography, and scientific photography. Illumination systems, bright field, phase-contrast, dark field, fluorescence and other microscopic techniques. Photographic and video image recording of microscopic and macroscopic scientific specimens. Prerequisites: advanced standing in biological sciences and permission of instructor. Offered: on demand; A.

BOTANY 490 Undergraduate Seminar (1-3, max. 6) NW Presentation and discussion of undergraduate research, including honors projects, and selected topics in botany and related biological sciences. Credit/no credit only. Prerequisite: 20 credits in biological sciences. Offered: AWSp.

BOTANY 496 Peer Teaching Assistantships in Botany (1-5) *Ammirati, Bliss, del Moral, Haskins, Olmstead, Waaland* Direct experience in the classroom, typically teaching a lab section of an undergraduate course. Peer TA's attend lectures and weekly

preparation meetings and gain in-depth background in the subject material as well as training in teaching techniques and approaches. Prerequisite: permission of instructor. Offered: AWSp.

BOTANY 498 Special Problems in Botany (1-15) Students with suitable background in botany may enroll for special study in phycology, anatomy, ecology, mycology, morphology, paleobotany, physiology, or taxonomy. Prerequisite: permission of instructor. Offered: AWSp.

Courses for Graduates Only

BOTANY 501 Tutorial in Botany (1-5, max. 10) Small-group study and discussion of a specified topic in the plant sciences, largely in fields not covered by courses and existing special area seminars. Impetus for registration would come from two or more graduate students finding a faculty member who shares with them an interest in the topic. Prerequisite: permission of instructor. Offered: AWSp.

BOTANY 502 Teaching Assistant Orientation (3) Laboratory and lecture preparation, organization, and presentation for incoming botany graduate students. Two student presentations required: to be self-, instructor-, and peer evaluated. Credit/no credit only. Offered: A.

BOTANY 505 Introduction to Modern Botany (2, max. 4) For incoming graduate students in botany and certain interdisciplinary programs. Reviews recent advances in modern botany, covering molecular, cellular, organismal, and community areas.

BOTANY 511 Scanning Electron Microscopy and Energy Dispersive Spectroscopy (2/3) *Reine* Principles and practice of scanning electron microscopy and energy dispersive spectroscopy applied to biological and non-biological materials. Includes sample preparation, critical point drying, sputter coating, SEM operation, photomicrography, backscattered electron imaging, SEM alignment and performance maximization, x-ray microanalysis, x-ray dot maps, and quantitative x-ray microanalysis. Prerequisite: permission of instructor. Offered: AWSp.

BOTANY 520 Seminar (1, max. 18) Credit/no credit only. Offered: AWSp.

BOTANY 521 Topics in Plant Physiology (1-3, max. 10) *Cleland, Van Volkenburgh* Modern trends and methods in plant physiology. Credit/no credit only. Prerequisite: permission of instructor. Offered: AWSp.

BOTANY 522 Seminar in Morphology and Taxonomy (1-3, max. 10) *Olmstead* Current research and trends in morphology and taxonomy of higher plants. Prerequisite: permission of instructor. Credit/no credit only. Offered: AWSp.

BOTANY 523 Selected Topics in Mycology (1-3, max. 10) *Ammirati, Whisler* Selected topics from all phases of mycology. Credit/no credit only. Prerequisite: permission of instructor. Offered: AWSp.

BOTANY 524 Topics in Phycology (1-3, max. 10) *Cattolico, Waaland* Topics from all phases of phycology. Credit/no credit only. Prerequisite: permission of instructor. Offered: AWSp.

BOTANY 525 Topics in Plant Ecology (1-3, max. 10) *Bliss, del Moral, Leopold* Selected topics from various phases of plant ecology. Credit/no credit only. Prerequisite: permission of instructor. Offered: AWSp.

BOTANY 526 Topics in Paleocology (1-3, max. 6) *Leopold, Tsukada* Discussion and review of literature on soil and leaf architecture in deposition sediments, and paleocology. Credit/no credit only. Prerequisite: permission of instructor. Offered: AWSp.

BOTANY 527 Advanced Topics in Plant Molecular Systematics and Evolution (1-3, max. 10) *Bendich, Cattolico* In-depth discussion of topics which emphasize molecular level systematics and evolution.

Credit/no credit only. Prerequisite: permission of instructor. Offered: on demand.

BOTANY 529 Topics in Plant Molecular Biology (1-3, max. 10) *Bendich, Cornal* Discussions of recent trends in plant molecular biology, genetics, and development. Credit/no credit only. Prerequisite: permission of instructor. Offered: AWSp.

BOTANY 530 Topics in Plant Population Ecology (1-3, max. 10) *Schemske* Discussions of recent developments in plant population biology and ecology. Credit/no credit only. Prerequisite: permission of instructor. Offered: AWSp.

BOTANY 545 Marine Phycology (9) - Waaland Morphology, life histories, systematics, and ecology of marine algae, with emphasis on the local flora. Prerequisite: ten credits of biological sciences or permission of the Director of Friday Harbor Laboratories. Offered: at Friday Harbor; S.

BOTANY 549 Advanced Phycology (9) *Waaland* Varied marine algal flora of the San Juan region. Topic changes from year to year. Individual research projects. Prerequisites: 545 or equivalent and permission of the Director of Friday Harbor Laboratories. Offered: at Friday Harbor.

BOTANY 551 Plant Population Biology (3) *Schemske* An overview of the current conceptual issues in plant population biology, including modes of evolution, population structure, sex and the mating system, life-history evolution, demography, and speciation. Prerequisites: BIOL 203 and 454 or permission of instructor. Offered: odd years; Sp.

BOTANY 552 Vegetation of North America (5) *Bliss* Detailed analysis of the biomes of America north of Columbia, including principles of plant geography, floristics, climate, soils, ecophysiology, paleobotany, vegetation structure, and community patterns. Prerequisite: 350 and 354 or equivalent. Offered: even years; W.

BOTANY 554 Palynology and Quaternary Phytogeography (5) *Tsukada* Study of former vegetation and environments by relating the fossil pollen record to ecological principles; fundamentals and applications of pollen-spore morphology and pollen analysis. Two full-day (Friday and Saturday) field trips required. Prerequisites: 113 and BIOL 472 or permission of instructor.

BOTANY 565 Marine Mycology (9) *Whisler* Taxonomy and morphology of aquatic fungi with emphasis on marine forms. Prerequisites: 461 or 20 credits in biology and permission of the Director of Friday Harbor Laboratories. Offered: S.

BOTANY 575 Transport Processes in Plants (3) *Van Volkenburgh* Analysis of pathways and mechanisms of water, ion, and sugar transport in higher plants, from abiophysical understanding of membrane properties, water potential, and electrophysiology to whole plant control of water status, nutrient transport, and carbon allocation. Prerequisites: 371 and 372 or permission of instructor. Recommended: 441. Offered: on demand.

BOTANY 577 Plant Growth and Development (3) *Cleland* Control of growth, development, and differentiation in higher plants by hormones. Prerequisite: permission of instructor. Offered: on demand.

BOTANY 579 Environmental Control of Plant Growth and Development (3) *Cleland* Effects of light, temperature, and water stress on the growth, development, and metabolism of higher plants. Prerequisite: 371 or permission of instructor. Offered: on demand.

BOTANY 597 Advanced Reading in Botany (1-3, max. 12) Reading and evaluation of subject matter in plant, algal, and fungal biology. Credit/no credit only. Prerequisite: permission of instructor. Offered: AWSp.

BOTANY 598 Field Studies in Botany (1-6, max. 12) Field studies of plants, algae or fungi. Emphasis on methods and techniques for gathering and evaluating field data. Credit/no credit only. Prerequisite: permission of instructor. Offered: AWSp.

BOTANY 599 Laboratory Studies in Botany (1-6, max. 12) Laboratory studies of plants, algae, and/or fungi. Emphasis on methods, procedures, and evaluating research results. Credit/no credit only. Prerequisite: permission of instructor. Offered: AWSp.

BOTANY 600 Independent Study or Research (*) Credit/no credit only. Offered: AWSp.

BOTANY 700 Master's Thesis (*) Credit/no credit only. Offered: AWSp.

BOTANY 800 Doctoral Dissertation (*) Credit/no credit only. Offered: AWSp.

Canadian Studies

See International Studies.

Chemistry

109 Bagley

Chemistry is a branch of natural science that deals principally with the properties of substances, the changes they undergo, and the natural laws that describe these changes.

Undergraduate Program

Adviser
Lani Stone
109C Bagley
email: stone@chem.washington.edu
(206) 543-9343 or 1-800-869-2436

Bachelor of Science

Admission Requirements: Recommended high school preparation includes four years of college preparatory mathematics, one year of physics, one year of chemistry, and one year of biology.

Major Requirements: MATH 124, 125, 126 and two courses above 200 (recommended: MATH 307 or AMATH 351, and MATH 308 or AMATH 353; MATH 205 can substitute for MATH 308 or AMATH 353); (alternative MATH requirement: 134, 135, 136); one year of physics including at least 1 credit of laboratory (PHYS 114, 115, 116, 118; or PHYS 121/131, 122/132, 123/133, with the 121/131 sequence recommended); CHEM 145 (or 140); CHEM 155, 165 (or 150, 160, 312); CHEM 141, 151, 161; CHEM 317 and 321; CHEM 335, 336, 337, 346, 347 (or 237, 238, 239, 241, 242 with a GPA of 3.00 or higher in 237, 238, and 239 or a passing score in the standard American Chemical Society examination); CHEM 416, 455, 456, 457; 14 credits of numerically graded CHEM 400 courses (not previously listed), which must include CHEM 461 and two more courses with laboratory (currently 426, 462, 463, 464, 465); strongly recommended, research credits in CHEM 399 and 499. Minimum GPA of 2.80 in chemistry courses and a minimum grade of 1.7 in all required chemistry courses. For graduation 192 credits are required with a cumulative GPA of 2.80 or better.

Bachelor of Arts

Admission Requirements: Same as for the Bachelor of Science degree.

Major Requirements: MATH 124, 125, 126 (or MATH 134, 135, 136); one year of physics, including 1 credit

of laboratory; CHEM 140 (or 145); CHEM 150, 160, 312 (or 155, 165); CHEM 141, 151, 161; CHEM 321; CHEM 237, 238, 239, 241, 242 (or 335, 336, 337, 346, 347) [or (223, 224 or 237, 238), 241, 317, 416]; CHEM 455; CHEM 456, 457 (or 350, 351), (or 452); 5 credits of numerically graded CHEM 400 courses (not previously listed), which must include CHEM 461; minimum GPA of 2.00 in chemistry courses, and a minimum grade of 1.7 in all required chemistry courses.

The maximum number of credits which may be earned combining CHEM 399 and 499 is 24. Individual degree programs may impose separate credit limits.

Minor

Minor Requirements: Option A: 28-43 credits in chemistry to include CHEM 120, 250, 312 (13 credits); or 140, 141, 150, 151, 160, 161, 312, 452 (23 credits); or 145, 155, 165, 352 (19 credits); and CHEM 220, 221 (10 credits); or 223, 224, 241 (11 credits); or 237, 238, 239, 241 (14 credits); or 335, 336, 337, 346 (15 credits); and CHEM 321 (5 credits).

Option B: 37 credits in chemistry to include CHEM 120, 220, 221, 250, 312, 321.

Options A and B: MATH 124 and PHYS 114 (or 121/131) (9-10 credits). Minimum GPA of 2.00, and a minimum grade of 1.7 for all courses presented for the minor.

Graduate Program

Director of Student Services
Nancy J. Cooper
109E Bagley
email: cooper@chem.washington.edu
(206) 543-4791 or 1-800-869-2436

The Master of Science and Doctor of Philosophy programs are designed to lead to positions of leadership and independent investigation in research institutes, industrial laboratories, and government agencies, and as teachers, researchers, or administrators in colleges and universities in chemistry or in fields having substantial chemistry content.

Students can pursue research in the following areas of chemistry: analytical, bioinorganic, bioorganic, biophysical, environmental, inorganic, medicinal, nuclear, organic, organometallic, physical, polymer, process analytical, and theoretical.

Thesis research for the Master of Science degree and dissertation research for the Doctor of Philosophy degree should constitute an original contribution to knowledge worthy of report in the scientific literature.

Master of Science

Admission Requirements: Baccalaureate degree with major in chemistry or allied sciences; Graduate Record Examination.

Graduation Requirements: *With Thesis*—36 approved credits with 18 in courses at the 500 level or above; 21 in courses at the 400 or 500 level taken for numerical grade; 9 credits in thesis research. *Without Thesis*—Same as with thesis, except that additional course work may be substituted for the required research. GPA of 3.00 required for both degrees.

Doctor of Philosophy

Admission Requirements: Same as for the Master of Science degree.

Graduation Requirements: 18-27 credits of approved courses at the 400 or 500 level, with a total GPA of 3.00; candidacy examinations covering area of specialization; dissertation.

Faculty

Chair

Paul B. Hopkins

Professors

Andersen, Niels H. * 1968; PhD, 1967, Northwestern University; peptide conformations and protein folding, biophysical NMR, biorecognition, helix/coil theory.

Anderson, Arthur * 1946, (Emeritus); MS, 1942, PhD, 1944, University of Michigan; chemistry of nonclassical aromatic compounds and novel heterocycles.

Borden, Weston T. * 1972; PhD, 1968, Harvard University; molecular orbital theory of organic molecules and reactions, synthesis of unnatural products.

Callis, James B. * 1973; PhD, 1970, University of Washington; instrumentation development, process analytical chemistry, non-invasive clinical chemistry.

Campbell, Charles T. * 1989; PhD, 1979, University of Texas (Austin); physical chemistry of solid surfaces, chemisorption, catalysis, and surface analysis.

Charlson, Robert J. * 1965, (Adjunct); PhD, 1964, University of Washington; atmospheric chemistry, aerosol physics, aerosol/cloud/climate interaction.

Christian, Gary D. * 1972; PhD, 1964, University of Maryland; electroanalysis, flow injection analysis, process control.

Drobny, Gary P. * 1981; PhD, 1981, University of California (Berkeley); two-dimensional and multiple quantum studies in nuclear magnetic resonance.

Engel, Thomas * 1980; PhD, 1969, University of Chicago; surface chemistry and catalysis.

Epiotis, Nicholas * 1972; PhD, 1972, Princeton University; applied quantum chemistry.

Floss, Heinz G. * 1987; PhD, 1961, Technical University of Munich (Germany); bioorganic and natural products chemistry.

Gammon, Richard H. * 1985; PhD, 1970, Harvard University; atmospheric, marine, and environmental chemistry; biogeochemical cycles, global climate change.

Gelb, Michael H. * 1985; PhD, 1982, Yale University; mechanistic enzymology, bioorganic and medicinal chemistry.

Gouterman, Martin * 1966; PhD, 1958, University of Chicago; electronic spectra and luminescence of porphyrins, oxygen pressure sensing by luminescence quenching.

Gregory, Norman W. * 1946, (Emeritus); PhD, 1943, Ohio State University; structure and thermodynamic properties of inorganic substances, vaporization reactions.

Hakomori, Sen-Itiroh * 1967, (Adjunct); MD, 1951, DMedSc, 1956, Tohoku Imperial University (Japan); role of glycosphingolipids in defining antigenicity, cellular interaction.

Halsey, George D. * 1951, (Emeritus); PhD, 1948, Princeton University; surface absorption/interaction of rare gases, solid solutions of rare gases, catalysis, colloids.

Heinekey, Dennis M. * 1991; PhD, 1982, University of Alberta (Canada); organometallic chemistry of the transition metals.

Hopkins, Paul B. * 1982; PhD, 1982, Harvard University; organic synthesis, bioorganic and nucleic acid chemistry.

Kowalski, Bruce * 1973; PhD, 1969, University of Washington; analytical chemometrics, computerized instrumentation for process monitoring and control.

Krohn, Kenneth A. * 1981, (Adjunct); PhD, 1971, University of California (Davis); chemistry, radiation oncology.

Kwiram, Alvin L. * 1970; PhD, 1963, California Institute of Technology; molecular structure/dynamics in the solid state with emphasis on excited states, magnetic resonance.

Lingafelter, Edward C. * 1939, (Emeritus); PhD, 1939, University of California (Berkeley); crystal and molecular structure of coordination compounds.

Mayer, James M. * 1984; PhD, 1982, California Institute of Technology; inorganic/organometallic chemistry, synthesis/mechanism of reactions of transition metal compounds.

Parson, William W. * 1971, (Adjunct); PhD, 1965, Case Western Reserve University; bioenergetics, with particular emphasis on photosynthesis, picosecond spectroscopy.

Pocker, Yeshayau * 1961; PhD, 1953, University College, London (UK); DSc, 1960, University of London (UK); organic reaction mechanisms, chemical and enzymatic catalysis, metalloenzymes.

Rabinovitch, B. Seymour * 1948, (Emeritus); PhD, 1942, McGill University (Canada); chemical dynamics, energy relaxation, properties of silver surfaces.

Raucher, Stanley * 1975; PhD, 1973, University of Minnesota; new methods in synthetic organic chemistry, total synthesis of natural products.

Reid, Brian R. * 1980; PhD, 1965, University of California (Berkeley); biophysical chemistry.

Reinhardt, William P. * 1991; PhD, 1968, Harvard University; theoretical and computational chemistry with applications in chemistry and biophysics.

Robinson, Bruce H. * 1980; PhD, 1975, Vanderbilt University; magnetic resonance, molecular dynamics, polymer dynamics, nonlinear response theory.

Rose, Norman J. * 1966; PhD, 1960, University of Illinois; design, synthesis, and study of coordination compounds of transition metals, including lanthanides.

Ruzicka, Jaromir * 1984; PhD, 1963, Technical University of Prague (Czech); analysis via flow injection for clinical research and industrial applications.

Schomaker, Verner * 1965, (Emeritus); PhD, 1938, California Institute of Technology; crystal structures by x-ray diffraction, molecular-sieve catalysts.

Schubert, Wolfgang M. * 1947, (Emeritus); PhD, 1947, University of Minnesota; mechanism/steric course of organic reactions, substituent and solvent effects, acid-base catalysis.

Schurr, J. Michael * 1966; PhD, 1965, University of California (Berkeley); dynamics, structures, and energetics of linear and supercoiled DNAs; laser optical and nmr methods.

Slutsky, Leon J. * 1961; PhD, 1957, Massachusetts Institute of Technology; lattice dynamics, kinetics of conformational change, physical absorption.

Stuve, Eric M. * 1985, (Adjunct); PhD, 1984, Stanford University; catalytic and electrochemical surface science.

Trager, William F. * 1972, (Adjunct); PhD, 1965, University of Washington; medicinal chemistry, bioanalytical chemistry drug metabolism.

Turecek, Frantisek * 1990; PhD, 1977, Charles University Czechoslovakia; mass spectrometry and organic structural analysis.

Vandenbosch, Robert * 1963; PhD, 1957, University of California (Berkeley); nuclear fission and nuclear reaction mechanisms, atomic and molecular clusters, C_{60} .

Watts, Robert O. * 1986; PhD, 1968, Australian National University; properties of small molecular clusters by theoretical and experimental investigations.

Yager, Paul * 1987, (Adjunct); PhD, 1980, University of Oregon; physical chemistry and applications of biomembranes.

Zoller, William H. * 1984; PhD, 1969, Massachusetts Institute of Technology; analytical, environmental, and nuclear chemistry.

Associate Professors

Crittenden, Alden L. * 1947, (Emeritus); PhD, 1947, University of Illinois; mass spectra, solid electrode polarography.

Jónsson, Hannes * 1988; PhD, 1985, University of California (San Diego); computer simulations and scattering calculation in materials and surface science.

Klevit, Rachel E. * 1983, (Adjunct); DPhil, 1981, Oxford University (UK); molecular recognition, protein NMR.

Kovacs, Julia A. * 1988; PhD, 1986, Harvard University; synthesis, structure, and reactivity of biologically relevant transition-metal complexes.

Macklin, John W. * 1968; PhD, 1969, Cornell University; spectroscopic studies of materials in condensed phase and in solutions.

Olmstead, Marjorie A. * 1991, (Adjunct); PhD, 1985, University of California (Berkeley); experimental condensed-matter physics, surface and interface physics.

Sasaki, Tomikazu * 1989; PhD, 1985, Kyoto University (Japan); design and synthesis of functional proteins and protein mimetics.

Stenkamp, Ronald E. * 1978, (Adjunct); PhD, 1975, University of Washington; crystallography, metalloprotein, protein engineering, blood clotting protease.

Synovec, Robert E. * 1986; PhD, 1986, Iowa State University; laser-based liquid chromatography detectors, separation theory, analytical instrumentation.

Woodman, Darrell J. * 1985; PhD, 1965, Harvard University; peptide synthesis, heterocyclic compounds, chemistry of ketoketenimines.

Assistant Professors

Goldberg, Karen 1995; PhD, 1988, University of California (Berkeley); synthetic and mechanistic organometallic chemistry.

Haile, Sossina M. * 1993, (Adjunct); PhD, 1992, Massachusetts Institute of Technology; ion transport in solids, crystal growth, x-ray diffraction.

Reid, Philip J. 1995; PhD, 1992, University of California (Berkeley); chemical reaction dynamics in solution.

Senior Lecturers

Nyasulu, Frazier W. 1991; PhD, 1985, University of Salford (UK); chemical education, electroanalytical chemistry.

Selke, Sara 1983; PhD, 1983, University of Washington; chemical education, retention of underrepresented minorities and women in science and mathematics.

Wiegand, Deborah H. 1990; PhD, 1990, Northern Illinois University; chemical education, electrochemistry on liquid/liquid interfaces.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

No more than the number of credits indicated can be counted toward graduation from the following course groups: 140, 141, 145 (5 credits); 145, 155, 160, 161 (10 credits); 145, 155, 250 (10 credits); 165, 312 (5 credits); 220, 223, 237, 335 (5 credits); 238, 336 (4 credits); 221, 224, 239, 337 (5 credits); 241, 346 (3

credits); 242, 347 (3 credits); 452, 456 (4 credits). If a course is completed before a prerequisite is taken, credit will not later be allowed for the prerequisite course.

CHEM 115 Chemistry for Life (5) NW Introduction to chemistry covering selected principles and their effect on ourselves and our environment. Includes scientific investigations conducted outside the laboratory with full class participation. Intended for non-science majors wishing to improve their science literacy and develop a long-term interest in science. Offered: Sp.

CHEM 120 Introduction to General Chemistry (5) NW, QSR. One quarter introduction to chemistry for students with little or no chemistry background. Atoms and molecules, including structure of atoms, chemical bonding, chemical reactions, phases of matter, solutions, equilibrium, and reaction rates. Includes laboratory. Can stand alone or be followed by 140 or 220. Offered: AWS.

CHEM 140 General Chemistry (4) NW, QSR For science and engineering majors. Atomic nature of matter, stoichiometry, periodic table, quantum concepts, gas laws. Prerequisites: high school algebra and chemistry or 120 and MATH 111 or 120. Recommended: high school physics and concurrent registration in 141 and MATH 124. Offered: AWSpS.

CHEM 141 General Chemistry Laboratory (1) NW Introduction to laboratory work, including experiments to illustrate analytic techniques, stoichiometry, and gas laws. Designed to complement 140. Credit/no credit only. Prerequisite: prior completion of, or concurrent registration in, 140. Offered: AWSpS.

CHEM 145 Honors General Chemistry (5) NW, QSR For science, engineering, and other majors with strong mathematics and science background in high school. Includes integrated computer and chemistry laboratory experiments. Together 145 and 155 cover material in 140, 141, 150, 151, 160, and 161. Familiarity with differential calculus encouraged. Prerequisite: MATH 124 which may be taken concurrently. Offered: A.

CHEM 150 General Chemistry (4) NW Chemical bonding and structure, elementary organic and polymer chemistry, inorganic Lewis acids and bases. Prerequisite: 140 or 145. Recommended: concurrent registration in 151. Offered: AWSpS.

CHEM 151 General Chemistry Laboratory (1) NW Experiments to include absorption and emission spectroscopy, separations and elementary organic synthesis. Designed to complement 150. Credit/no credit only. Prerequisites: 120 or 141 and prior completion of, or concurrent registration in, 150. Offered: AWSpS.

CHEM 155 Honors General Chemistry (5) NW Continuation of 145. Includes integrated computer and chemistry laboratory experience. Together 145 and 155 cover material in 140, 141, 150, 151, 160, and 161. Prerequisite: 145. Offered: W.

CHEM 160 General Chemistry (4) NW Introduction to chemical thermodynamics (first and second laws), equilibrium, electrochemistry and kinetics. Prerequisite: 150. Recommended: concurrent registration in 161. Offered: AWSpS.

CHEM 161 General Chemistry Laboratory (2) NW Introductory experiments in acid-base equilibrium, electrochemistry, thermochemistry, chemical kinetics. Designed to complement 160. Prerequisite: 151 and prior completion of, or concurrent registration in, 160. Offered: AWSpS.

CHEM 165 Honors General Chemistry (6) NW Introduction to systematic inorganic chemistry: representative elements, metals, and nonmetals. Includes coordination complexes, geochemistry, and metallurgy. Additional material on environmental applications of basic chemistry presented. Prerequisite: 155 or permission of instructor. Offered: Sp.

CHEM 197 Science Outreach Training (1) Training for participation in science-related outreach activities to the community. Emphasis on support for K-12 education and environmental community efforts. Not applicable toward chemistry degree requirements. Credit/no credit only. Offered: AWSp.

CHEM 199 Special Problems (1-6) Research in chemistry. Credit/no credit only. Prerequisites: permission of chemistry adviser and chemistry grade-point average above 3.00. Offered: AWSpS.

CHEM 203 Chemistry and the Environment (5) NW, QSR Role of small amounts (traces) of chemicals in our bodies and in global, regional, and local environments. Traces of certain chemicals influence events leading to acid rain, smog, nuclear waste management, and wastewater treatment. Intended for nonscience majors. Prerequisite: 120 or equivalent.

CHEM 220 Introduction to Organic and Biochemistry (5) NW Structure and properties of organic compounds: hydrocarbons, alcohols, aldehydes, ketones, carboxylic acids, carbohydrates, lipids, and proteins. Includes laboratory. Prerequisite: 120 or advanced placement in chemistry. Offered: AWSpS.

CHEM 221 Introduction to Biochemical Processes (5) NW Enzymes, nucleic acids and protein synthesis, natural products, drugs and drug metabolism, nutrition and bioenergetics, vitamins and cofactors, hormones, body fluids, biosynthetic pathways. Includes laboratory. Prerequisite: 120. Offered: Sp.

CHEM 223 Organic Chemistry—Short Program (4) NW First of a two-quarter lecture series in organic chemistry, for majors in biology and related fields who elect not to complete the full year sequence. Introduction to structure, nomenclature, reactions, and synthesis of the main functional group families of organic compounds. Prerequisite: 155 or 160. No organic laboratory accompanies this course.

CHEM 224 Organic Chemistry—Short Program (4) NW Continuation of the abbreviated coverage of the main functional group families of organic compounds. Short introduction to biomolecules: lipids, carbohydrates, amino acids, proteins, and nucleic acids. Prerequisite: 223.

CHEM 237 Organic Chemistry (4) NW First course for students planning to take three quarters of organic chemistry. Structure, nomenclature, reactions, and synthesis of the main types of organic compounds. Prerequisite: 155 or 160. No organic laboratory accompanies this course. Offered: AWSpS.

CHEM 238 Organic Chemistry (4) NW Second course for students planning to take three quarters of organic chemistry. Further discussion of physical properties and transformations of organic molecules, especially aromatic and carbonyl compounds. Prerequisite: 237. Offered: WSpS.

CHEM 239 Organic Chemistry (3) NW Third course for students planning to take three quarters of organic chemistry. Polyfunctional compounds and natural products, lipids, carbohydrates, amino acids, proteins, and nucleic acids. Prerequisite: 238. Offered: ASpS.

CHEM 241 Organic Chemistry Laboratory (3) NW Introduction to organic laboratory techniques. Preparation of representative compounds. Designed to be taken with 224 or 238. Prerequisites: 155 or 161; 223 or 237. Offered: WSpS.

CHEM 242 Organic Chemistry Laboratory (3) NW Preparations and qualitative organic analysis. Designed to be taken with 239. Prerequisites: 224 or 238; 241. Offered: ASpS.

CHEM 250 Introduction to Physical Chemistry (5) NW Thermodynamic discussion of chemical equilibrium with application to phase change, acid-base, precipitation, and electrochemistry. First, second, and third laws of thermodynamics including definition and

discussion of enthalpy, entropy, and free energy; also reaction rates. Includes laboratory. Prerequisites: 140, 141, 150, 151 or 120, 220; MATH 124, PHYS 114 or 121 and 131. Offered: A.

CHEM 297 Science Outreach Participation (1-2) Continuation of 197. Work with K-12 schools or community organizations. May include scientific presentations, K-12 curriculum support, or involvement in a community project. Not applicable toward chemistry degree requirements. Credit/no credit only. Prerequisite: 197. Offered: AWSp.

CHEM 299 Special Problems and Report Writing (1-6) Research in chemistry and/or study in the chemical literature. Requires writing a scientific report. Credit/no credit only. Prerequisites: permission of chemistry adviser and a chemistry grade-point average above 3.00. Offered: AWSpS.

CHEM 312 Inorganic Chemistry (3) NW The periodic table: chemistry of representative and transition elements. Aqueous chemistry, solid state chemistry, and everyday aspects of inorganic chemistry emphasized. Not intended for students who have completed 165. Prerequisites: one of 155, 160, or 250 and one of 221, 223, 237 or 335. Offered: A.

CHEM 317 Inorganic Chemistry Laboratory (3) NW Experimental exploration of the periodic table. Techniques of preparation and characterization of inorganic compounds. Handling of air-sensitive materials and gases. Prerequisites: 165 or 312; 161; 242 or 347. Offered: W.

CHEM 321 Quantitative Analysis (5) NW Introduction to chemical analysis, including gravimetric, volumetric, spectrophotometric, and potentiometric analyses. Laboratory computer use included. Prerequisites: 155 or 160; 161. Offered: AWS.

CHEM 335, 336, 337 Honors Organic Chemistry (4, 4, 4) NW For chemistry majors and otherwise qualified students planning three or more quarters of organic chemistry. Structure, nomenclature, reactions, and synthesis of organic compounds. Theory and mechanism of organic reactions. Studies of biomolecules. Prerequisites: 160 or 155 for 335; 335 for 336; 336 for 337. No organic laboratory accompanies 335. Offered: A, W, Sp.

CHEM 346 Organic Chemistry Honors Laboratory (3) NW To accompany 336. Prerequisites: 155 or 161; 336, which may be taken concurrently. Offered: W.

CHEM 347 Organic and Qualitative Organic Honors Laboratory (3) NW Continuation of 346. To accompany 337. Prerequisites: 337, which may be taken concurrently, and 346. Offered: Sp.

CHEM 350, 351 Elementary Physical Chemistry (3, 3) NW Survey of some major topics in physical chemistry with emphasis on thermodynamics and kinetics. Equilibrium systems, solutions, electrochemistry, phase diagrams, and transport properties. Prerequisites: 155 or 160, PHYS 116, and MATH 125 (126 recommended) or MATH 112 for 350; 350 for 351.

CHEM 397 Science Outreach Mentors (1) Mentoring of beginning outreach participants. Includes presentations for 197, training of outreach students, and evaluation of outreach activities. Not applicable toward chemistry degree requirements. Credit/no credit only. Prerequisite: 197. Offered: AWSp.

CHEM 399 Undergraduate Research (* max. 12) Research in chemistry. Credit/no credit only. Prerequisites: permission of chemistry adviser, chemistry grade-point average above 3.00, and junior standing. Offered: AWSpS.

CHEM 410 Radiochemistry Laboratory (2) NW Introductory general service course for students planning further work in nuclear or tracer applications. Safety procedures, detection and measurement of nuclear radiation, radiochemical and tracer tech-

niques. Prerequisite: one year of laboratory science. Recommended: 418. Offered: alternate years.

CHEM 414 Chemistry of the Main Group Elements (3) NW The elements and their compounds in relation to the periodic system. Prerequisites: 165 or 312; 455; 351, 452, or 457, which may be taken concurrently. Offered: alternate years.

CHEM 415 The Chemical Bond (3) NW Nature of the chemical bond. Simple bonding theories, molecular orbital methods, symmetry, and group theory. Includes computer exercises in which students perform ab initio calculations. Prerequisite: 455. Offered: W.

CHEM 416 Transition Metals (3) NW Survey of selected key topics in the chemistry of the transition metals, including emphasis on the structure, bonding, and reactivity of major classes of compounds. Prerequisites: 164 or 312; 455, which may be taken concurrently. Offered: A.

CHEM 417 Organometallic Chemistry (3) NW Chemistry of the metal-carbon bond for both main group and transition metals. Structure and reactivity with applications to organic synthesis and catalysis. Prerequisites: 165 or 312; 224, 239, or 337. Recommended: 416. Offered: W.

CHEM 418 Nuclear Chemistry (3) NW Natural radioactivity, nuclear systematics and reactions, radioactive decay processes, stellar nucleosynthesis, applications of radioactivity. Prerequisite: 350, 452, or 455. Offered: alternate years.

CHEM 419 Bioinorganic Chemistry (3) NW Description of transition metal-containing systems found in biology. Structural and electronic properties and reactivity of metalloproteins, metalloenzymes, and metal cofactors. Methods used to probe and model metal sites by spectroscopic and synthetic techniques. Prerequisites: 165 or 312; 224, 239, or 337. Recommended: 416. Offered: Sp.

CHEM 426 Instrumental Analysis (3) NW Introduction to modern instrumental methods of chemical analysis, including chromatography, optical and mass spectroscopy, electrochemistry and flow injection analysis. Basic concepts of transducers, spectrometers, mass analysis, separation sciences, and computerized data acquisition and reduction. Prerequisite: 321. Offered: Sp.

CHEM 427 Principles of Modern Wet Analysis (3) NW Sampling and sample dissolution, multiple chemical equilibria, pH and electrochemical measurement, reagent-based kinetic enzyme assays and immunoassays. Principles of process, environmental, clinical, and biotechnological assays. Separations and flow injection. Prerequisites: 223 or 237 or 335; 321. Offered: W.

CHEM 429 Chemical Separation Techniques (3) NW Introduction to modern separation techniques such as gas chromatography, high-performance liquid chromatography, electrophoresis, and field flow fractionation. Prerequisites: 224, 239, or 337; 241 or 346. Recommended: 321. Offered: W.

CHEM 433 Theoretical Organic Chemistry—Predictions and Experimental Tests (3) NW Molecular orbital theory in organic chemistry. Woodward-Hoffmann rules, aromaticity, concerted reactions, photochemical transformations, and reactions of electron-deficient species. Prerequisite: 337 or permission of instructor. Offered: alternate years.

CHEM 435 Introductory Biophysical Chemistry (3) NW Survey of the statics and dynamics of biophysical and biochemical processes. Prerequisites: 224, 239, or 337; 351, 452, or 456, which may be taken concurrently. Recommended: BIOC 405 or 440. Offered: alternate years; W.

CHEM 436 Bioorganic Chemistry—Enzymes and Natural Products (3) NW Enzyme chemistry and inhibition, including modes of biological catalysis, ste-

reochemistry, enzyme characterization and kinetics, and design and principles of enzyme inhibitors. Also major classes of natural products, their chemistry, biological activity, biosynthesis, physiological role, and ecological significance. Prerequisite: 224, 239, or 337. Recommended: BIOC 405 or 440. Offered: alternate years; Sp.

CHEM 437 Organic and Bioorganic Chemistry of Nucleic Acids in Proteins (3) NW Chemistry of DNA, RNA, peptides, and proteins. Solid phase chemical synthesis. Manual and automated sequencing. Conformational analysis. Peptide mimetics and protein design. Interaction of DNA with drugs and toxins. Triple helices and antisense oligonucleotides. Prerequisite: 239 or equivalent. Offered: Sp.

CHEM 452 Physical Chemistry for Biologists (4) NW General equilibrium thermodynamics and aspects of the theory of transport properties, reaction kinetics, and electrochemical phenomena of particular relevance in the biological sciences. Prerequisites: 155, 160, or 250, MATH 125, and PHYS 115 or 122. Offered: A/WSp.

CHEM 455 Physical Chemistry (3) NW Introduction to quantum chemistry and spectroscopy. Theory of quantum mechanics presented at an elementary level and applied to the electronic structure of atoms and molecules and to molecular spectra. Prerequisites: 155 or 160, MATH 126, and college physics. Recommended: MATH 308. Offered: ASpS.

CHEM 456 Physical Chemistry (3) NW Chemical thermodynamics. Laws of thermodynamics presented with applications to phase equilibria, chemical equilibria, and solutions. Prerequisites: 155 or 160, MATH 126, and college physics. Recommended: MATH 307 and 308. Offered: WS.

CHEM 457 Physical Chemistry (3) NW Introduction to statistical mechanics, kinetic theory, and chemical kinetics. Prerequisites: 455 and 456. Offered: WSp.

CHEM 458 Global Atmospheric Chemistry (4) NW Global atmosphere as chemical system. Physical factors and chemical processes. Natural variabilities and anthropogenic change. Cycling of trace substances. Global issues such as climate change, acidic deposition, influences on biosphere. Prerequisites: ATM S 358 or CHEM 452 or 456 or permission of instructor. Offered: jointly with ATM S 458; A.

CHEM 460 Spectroscopic Molecular Identification (3) NW Basic theory of spectral techniques—Infrared and ultraviolet/visible spectroscopy, NMR, and mass spectrometry—with emphasis on spectral interpretation skills needed for the elucidation of structure, conformation, and dynamics in organic and biological chemistry. Prerequisites: 224 or 239 or 337. Recommended: 455. Offered: ASp.

CHEM 461 Physical Chemistry Laboratory (2-3) NW Physical measurements in chemistry. Vacuum techniques, calorimetry, spectroscopic methods, electrical measurements. Prerequisites: 161 or PHYS 132 or a higher-level laboratory; two courses from the following list: 455; 456 (or 452 or CHEM E 326), and 457 (which may be taken concurrently). Offered: A/WSpS.

CHEM 462 Techniques of Synthetic Organic Chemistry (2-3) NW Techniques of synthetic organic chemistry. Vacuum distillation, multistep synthesis, air sensitive reagents, photochemistry, chromatography, and separation techniques. Prerequisite: 347 or 242; 460, which may be taken concurrently. Offered: A.

CHEM 463 Spectroscopic Techniques for Structural Identification (2) NW Laboratory techniques of spectroscopic analysis for structural determination using UV, IR, NMR, mass spectroscopy. Prerequisite: 460, which may be taken concurrently. Offered: ASp.

CHEM 464 Computers in Data Acquisition and Analysis (3) NW Introduction to use of the computer in the chemistry laboratory. Principles of microcomputers and their use for such problems as data acquisition,

noise reduction, and instrument control. Prerequisites: 455, MATH 307 and 308 or equivalent. Offered: W.

CHEM 485 Computations in Chemistry (3) NW Computer calculations on color graphics workstations applied to problems in chemistry. Numerical methods and algorithms for calculating classical dynamics, quantum wavefunctions, wavepacket propagation, chemical kinetics. Use of computer programs for calculating electronic wavefunctions, molecular conformations, simulations of liquids and solids. Prerequisites: 455 and 456; 457, which may be taken concurrently. Offered: Sp.

CHEM 471 Physical Chemistry of Macromolecules (3) NW Classical hydrodynamic methods, and modern optical correlation and pulse techniques for studying dynamical motions and conformations of macromolecules, especially biopolymers, in solution. Cooperative thermal transitions, optical properties, and polyelectrolyte effects. Prerequisites: 457 or 351 or 452, and 455. Offered: alternate years; W.

CHEM 473 Workshop in the Teaching of Chemistry (* max. 15) NW Individual or group study project on the improvement of instruction in chemistry for K-6 teachers. Credit/no credit only. Prerequisites: 120 or 140. Offered: S.

CHEM 488 Teaching Chemistry (3) NW Training in teaching chemistry laboratory and quiz sections. For chemistry and biochemistry majors, especially those planning graduate work or secondary education. Covers teaching strategies, student diversity, learning styles, grading, and interaction with students and faculty. Credit/no credit only. Prerequisites: 2.8 GPA in chemistry and permission of instructor. Offered: A/WSp.

CHEM 499 Undergraduate Research and Report Writing (* max. 12) Research in chemistry and/or study in the chemical literature. Credit/no credit only. Prerequisites: permission of chemistry adviser, chemistry grade-point average above 3.00, and junior standing. Offered: A/WSpS.

Courses for Graduates Only

CHEM 502 Practical NMR Methods for Biological and Organic Structure Elucidation (4) Theory of NMR (rotating frame formalism, multi-pulse experiments, relaxation phenomena, 2D experiments) as applied to structural and dynamic problems in organic and biological chemistry. Provides basis for experiment selection and spectrum interpretation. A more advanced treatment of NMR than 460. Prerequisites: 224, 239, or 337. Recommended: 460 or equivalent, 435 or 455. Offered: W.

CHEM 508 Advanced Inorganic Chemistry (3, max. 9) Discussion of selected applications of physical techniques to the study of inorganic molecules. Topics include group theory, magnetic resonance spectroscopy (NMR and ESR), vibrational spectroscopy (IR and Raman), electronic spectroscopy, magnetism, and electrochemistry. Offered: Sp.

CHEM 510 Current Problems in Inorganic Chemistry (3, max. 12) Primarily for doctoral candidates in inorganic chemistry. Current topics (e.g., bioinorganic, advanced organometallic, materials and solid state, advanced inorganic spectroscopy). See department for instructor and topics during any particular quarter. Offered: Sp.

CHEM 520 Current Problems in Analytical Chemistry (2, max. 12) Primarily for doctoral candidates in analytical chemistry. Current topics (e.g., flow injection analysis, mass spectrometry, and advanced radiochemistry). See department for instructor and topics during any particular quarter. Offered: ASp.

CHEM 521 Analytical Electrochemistry (3) Theory and practice of modern electrochemistry with emphasis on instrumentation and applications in chemical analysis. Offered: alternate years.

CHEM 522 Atomic and Molecular Analytical Spectroscopy (3) Quantitative analysis of atomic and molecular species, using all forms of electromagnetic radiation, electrons, and gaseous ions. Offered: alternate years.

CHEM 525 Process Analytical Chemistry (3) Chemical sensors and systems approach to chemical analysis as an integral part of monitoring and controlling chemical, biological, and medical processes. Offered: alternate years.

CHEM 526 Chemometrics (3, max. 9) Mathematical and statistical methods for experimental design, calibration, signal resolution, and instrument control and optimization. Offered: alternate years.

CHEM 530 Advanced Organic Chemistry (3) Fundamental aspects of organic structures and transformations. Structure and basicity of carbanions, substitution reactions, elimination reactions, nucleophilic addition and addition/elimination reactions, condensation reactions, structure and rearrangements of carbocations, electrophilic addition, electrophilic substitutions, neighboring group effects. Prerequisite: 337. Offered: A.

CHEM 531 Advanced Organic Chemistry (3) Structure, mechanism, acidity and basicity, stereochemistry, kinetics and equilibria, reactive intermediates, and catalysis. Prerequisite: 530. Offered: W.

CHEM 532 Advanced Organic Chemistry (3) Synthetic organic chemistry. Discussion of practical methods for the synthesis of complex organic molecules with an emphasis on synthetic strategy and the control of stereochemistry. Prerequisite: 530 and 531. Offered: Sp.

CHEM 540 Current Problems in Organic Chemistry (3, max. 18) Primarily for doctoral candidates in organic chemistry. Discussions of topics of current interest and importance. See department for instructor and topic during any particular quarter.

CHEM 550 Introduction to Quantum Chemistry (3) Origins and basic postulates of quantum mechanics, solutions to single-particle problems, angular momentum and hydrogenic wave functions, matrix methods, perturbation theory, variational methods. Prerequisite: 455. Offered: A.

CHEM 551 Introduction to Quantum Chemistry (3) Electronic structure of many-electron atoms and molecules, vibration and rotation levels of molecules, effects of particle exchange, angular momentum and group theory, spectroscopic selection rules. Prerequisite: 550. Offered: W.

CHEM 552, 553 Statistical Mechanics (3, 3) General theorems of statistical mechanics, relation of the equilibrium theory to classical thermodynamics, quantum statistics, theory of imperfect gases, lattice statistics and simple cooperative phenomena, lattice dynamics and theory of solids, liquids, solutions, and polymers, time-dependent phenomena and mechanisms of interaction. Prerequisites: 455 and 456 (concurrent registration permitted) or equivalent for 552; 552 for 553. Offered: Sp, A.

CHEM 560 Current Problems in Physical Chemistry (3, max. 9) Primarily for doctoral candidates in physical chemistry. A discussion of topics selected from active research fields. See department for instructor and the topic during any particular quarter. Offered: W.

CHEM 561 Macromolecules (3, max. 9) Physical chemistry of macromolecules and biopolymers. Topics include solution thermodynamics, hydrodynamic properties, molecular weight distributions, optical and electro-optic techniques, chain configuration statistics, cooperative phenomena, theory of rubber elasticity, and polyelectrolytes. Offered: alternate years.

CHEM 570 Topics in Biotechnology (1, max. 9) Lectures reflecting faculty research in biotechnology.

Topics from botany, biochemistry, microbiology, genetics, chemistry, bioengineering, molecular biotechnology, pathology, and biological structure. Offered: A.

CHEM 581 Topics in Inorganic Chemistry (3, max. 18) Open only to students accepted for doctoral work in chemistry. Credit/no credit only. Offered: AWSp.

CHEM 582 Topics in Analytical Chemistry (3, max. 18) Open only to students accepted for doctoral work in chemistry. Credit/no credit only. Offered: AWSp.

CHEM 583 Topics in Organic Chemistry (3, max. 18) Open only to students accepted for doctoral work in chemistry. Credit/no credit only. Offered: AWSp.

CHEM 585 Topics in Physical Chemistry (3, max. 18) Open only to students accepted for doctoral work in chemistry. Credit/no credit only. Offered: AWSp.

CHEM 590 Seminar in General Chemistry (1, max. 18) For chemistry graduate students only. Credit/no credit only. Offered: AWSpS.

CHEM 591 Seminar in Inorganic Chemistry (1, max. 18) For chemistry graduate students only. Credit/no credit only. Offered: AWSpS.

CHEM 592 Seminar in Analytical Chemistry (1, max. 18) For chemistry graduate students only. Credit/no credit only. Offered: AWSpS.

CHEM 593 Seminar in Organic Chemistry (1, max. 18) For chemistry graduate students only. Credit/no credit only. Offered: AWSpS.

CHEM 595 Seminar in Physical Chemistry (1, max. 18) For chemistry graduate students only. Credit/no credit only. Offered: AWSpS.

CHEM 596 Seminar in Biotechnology (1, max. 6) Seminar presentations for doctoral students and faculty on biotechnology research by speakers from industry and academia. Offered: Sp.

CHEM 600 Independent Study or Research (*) Prerequisite: permission of coordinator. Offered: AWSpS.

CHEM 700 Master's Thesis (*) Prerequisite: permission of coordinator. Offered: AWSpS.

CHEM 800 Doctoral Dissertation (*) Prerequisite: permission of coordinator. Offered: AWSpS.

Chicano Studies

See American Ethnic Studies.

China Studies

See International Studies.

Classics

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Classics embraces the ancient Greek and Roman civilizations from prehistoric times to the Middle Ages. The department is concerned with both the Greek and Latin languages and their literatures, including poetry, drama, history, philosophy, rhetoric, and political theory, as well as with classical art and archaeology.

Classical Seminar in Rome: During spring quarter, the department offers instruction in classics for advanced

undergraduate majors and graduate students at the University of Washington Rome Center, located in the Palazzo Pio on the Campo de' Fiori.

Undergraduate Program

Bachelor of Arts

Major Requirements

Classical Studies: Greek or Latin through 307 or the equivalent; 36 additional credits chosen with department approval from courses in Greek and Latin at the 300 or 400 level (including 1 to 3 credits of CLAS 495, but excluding LATIN 300, 301, or GREEK 300, 301), classics in English, classical art and archaeology, ancient history, the history of ancient philosophy, and the history of ancient science. Classical studies is especially suited to students not preparing for graduate study in classics but wishing to explore the literature, history, art, archaeology, and philosophy of classical antiquity primarily through English translations.

Classics: 18 approved credits in Greek at the 400 level and 18 approved credits in Latin at the 400 level; 1 to 3 credits of CLAS 495, which may substitute for either Greek or Latin 400-level credit.

Greek: 27 approved credits in Greek at the 400 level plus 9 credits chosen with department approval from courses in Latin, Greek at the 400 level, classics in English, classical art and archaeology, ancient history, the history of ancient philosophy, and the history of ancient science. The major must include 1 to 3 credits of CLAS 495.

Latin: 27 approved credits in Latin at the 400 level plus 9 credits chosen with department approval from courses in Greek, Latin at the 400 level, classics in English, classical art and archaeology, ancient history, the history of ancient philosophy, and the history of ancient science. The major must include 1 to 3 credits of CLAS 495.

CLAS 101, 102, 205, and HIST 111 may not be offered in fulfillment of major requirements for baccalaureate degrees in the Department of Classics.

Minors

Minor Requirements

Classical Studies: 25 approved credits from classics in English, classical art and archaeology, ancient history, the history of ancient philosophy, and the history of ancient science.

Greek: Minimum 25 credits in Greek, including at least 6 credits at the 400 level (excluding 490).

Latin: Minimum 25 credits in Latin, including at least 6 credits at the 400 level (excluding 490).

Classics and Ancient History: 30 credits from the following list, including at least 20 upper-division credits (15 of which must be taken at the UW). 100-level credit is not accepted. Minimum 10 credits from each department (Classics and History). 2.0 minimum grade required in each course. Not available to students pursuing majors or other minors in classics.

Courses: CLAS 210, 320, 322, 324, 326, 328, 424, 427, 428, 430, 435, 445, 496 (except when topic is medieval); CLAR 340, 341, 342, 343, 442, 446, 448; GREEK (all upper-division courses except 300 and 301); LATIN (all upper-division courses except 300, 301, 401, and 402); HSTAM 201, 202, 205, 301, 336, 401, 402, 403, 405, 411, 412, 413, 414; HIST 498 (when topic is ancient).

Graduate Program

Stephen E. Hinds, Graduate Program Coordinator

The Department of Classics offers programs of graduate study leading to the Master of Arts and Doctor of Philosophy degrees. The M.A. degree may be in Greek, Latin, or Classics (a combination of Greek and Latin). The Ph.D. degree requires both Greek and Latin.

The program of formal instruction has been designed to ensure comprehensive and thorough training in the basic disciplines needed for teaching and research. The department offers courses in the major writers and periods of literature, philosophy, and history, in classical art and archaeology, and in Greek and Latin linguistics. The courses in Greek and Latin literature include many works on the Ph.D. degree reading list. Seminars introduce research techniques through the study of more specialized topics, which vary from quarter to quarter. Students may include in their programs courses and seminars given by other departments in such subjects as ancient philosophy, ancient and medieval history, comparative literature, and linguistics. A brochure, *The Graduate Program in Classics*, available from the department, gives additional information.

The Suzzallo Library has an extensive classics collection. The department's seminar room in Denny Hall, which is available to graduate students for their study and research, contains an excellent noncirculating library with such reference works as Pauly-Wissowa, *L'Année Philologique*, the *Thesaurus Linguae Latinae*, the *Müller Handbuch* series, the Teubner and Oxford texts, commentaries on the classical authors, standard collections of inscriptions and fragments, and a number of important serials. The department also possesses an Ibycus scholarly computer and a license for the *Thesaurus Linguae Graecae*, *Thesaurus Linguae Latinae*, and other data bases.

Applicants for admission to the M.A. program should present an undergraduate major or its equivalent in Greek, Latin, or Classics. Prospective aspirants for the Ph.D. degree should have had two years of upper-division study in both languages, but may be admitted with less preparation in one language if their preparation in the other language is exceptionally strong. Admission to the Ph.D. program may be granted after completion of the requirements for the M.A. degree.

M.A. degree requirements are a minimum of 27 credits in courses or seminars in Greek or Latin or both, and in related subjects approved by the department; a reading knowledge of French, German, or Italian; either an acceptable thesis or 9 additional credits in approved graduate courses and seminars and a research paper.

Doctor of Philosophy degree requirements are a minimum of 72 credits in courses or seminars in Greek, Latin, and related subjects approved by the department; a reading knowledge of German and either French or Italian; Greek and Latin prose composition; translation examinations on Greek and Latin; examinations in two special authors and one field of classical studies; an oral General Examination; dissertation and Final Examination. Graduate students must have teaching experience before completing requirements for their terminal degree.

A number of teaching assistantships are available. Assistants teach sections of elementary Latin and Greek, a course in Latin and Greek derivatives, hold discussion sections in classical literature in translation, or assist faculty members with other courses. The teaching load is four to six hours a week throughout the academic year.

Correspondence and Information

Graduate Program Coordinator
218 Denny, Box 353110

Faculty

Chair

Michael R. Halleran

Professors

Bliquez, Lawrence J. * 1969; PhD, 1968, Stanford University; Greek oratory, Greek historiography and historians, Greek and Roman medicine.

Halleran, Michael R. * 1983; PhD, 1981, Harvard University; Greek literature, especially tragedy; Greek intellectual history.

Harmon, Daniel P. * 1967; PhD, 1968, Northwestern University; Greek and Roman religion, Latin poetry, archaic Rome, classical linguistics.

MacKay, Pierre A. * 1966, (Emeritus); PhD, 1964, University of California (Berkeley); Greek literature, post-classical and Byzantine Greek literature, numismatics.

McDiarmid, John B. * 1949, (Emeritus); PhD, 1940, Johns Hopkins University; Greek literature and philosophy.

Pascal, Paul * 1953, (Emeritus); PhD, 1953, University of North Carolina; Latin literature and paleography, medieval Latin.

Associate Professors

Blundell, Mary Whitlock * 1985; PhD, 1984, University of California (Berkeley); Greek and Roman philosophy and literature.

Clauss, James J. * 1984; PhD, 1983, University of California (Berkeley); Latin poetry and prose, Hellenistic literature, Latin literature of the Empire.

Gowing, Alain M. * 1988; PhD, 1988, Bryn Mawr College; Latin and Greek historiography, Latin literature of the Empire.

Hinds, Stephen E. * 1992; PhD, 1985, St Johns College (Cambridge); Latin poetry, especially elegy and epic; literary criticism and theory.

Langdon, Merle K. * 1976; PhD, 1972, University of Pennsylvania; Greek archaeology, epigraphy, topography, and history.

Assistant Professors

Colwell, Sheila M. * 1990; PhD, 1992, Princeton University; archaic Greek literature, mythology, epic tradition.

Connors, Catherine M. * 1990; PhD, 1989, University of Michigan; Roman epic, ancient novel, women in Greek and Roman antiquity.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

Classical Archaeology

CL AR 340 Pre-Classical Art and Archaeology (3) VLPA Langdon Survey of the art and the other material remains of the civilizations in the Aegean from the Neolithic Age to the end of the Bronze Age, with special emphasis on Minoan Crete and the Mycenaean kingdoms of mainland Greece, illustrated by slides. The history, techniques, and results of significant excavations are examined. Offered: jointly with ART H 340.

CL AR 341 Greek Art and Archaeology (3) VLPA Bliquez, Langdon Survey of the material remains and the developing styles in sculpture, vase painting, architecture, and the minor arts from the geometric to the Hellenistic periods, illustrated by slides. Principal sites and monuments, as well as techniques and methods of excavation, are examined in an attempt to reconstruct

the material culture of antiquity. Offered: jointly with ART H 341.

CL AR 342 Roman Art and Archaeology (3) VLPA Harmon Roman architecture and art, with emphasis on the innovations of the Romans; illustrated by slides. Offered: jointly with ART H 342.

CL AR 343 Hellenistic Art and Archaeology (3) VLPA Langdon Survey of the art of Greece and the eastern Mediterranean from the time of Alexander the Great to the Roman conquest. Principal sites with their sculpture, painting, mosaics, and minor arts examined in lectures illustrated with slides. Offered: jointly with ART H 343.

CL AR 442 Greek and Roman Painting (3) VLPA Langdon Study of painted decoration on Greek vases, and Roman wall painting, with emphasis on the historical and stylistic development of each. Offered: jointly with ART H 442.

CL AR 444 Greek and Roman Sculpture (3) VLPA Langdon History and development of Greek sculpture and sculptors, their Roman copyists, and Roman portraits and sarcophagi. Emphasis on Greek sculpture of the fifth century BC. Offered: jointly with ART H 444.

CL AR 446 Greek Architecture (3) VLPA Langdon Detailed study of Greek architecture from its beginnings, with special emphasis on the Periclean building program in fifth-century Athens. Offered: jointly with ARCH 454/ART H 446.

CL AR 448 The Archaeology of Italy (3) VLPA Harmon Study of the principal archaeological sites in Italy with special emphasis on ancient Rome. Sites include the Alban hills, Ostia, Pompeii, Herculaneum, Tarquinia, Paestum, Tivoli, and Praeneste. Attention given to the relationship between material remains and their purpose in ancient life. Illustrated by slides. Offered: jointly with ART H 448.

Classics Courses in English

Upper-division classics courses in English (300 and 400 level) in the Department of Classics do not generally have prerequisites. Most 400-level courses deal with a single genre of literature or with a limited area of classical studies. The 300-level courses deal with broader subjects at a relatively advanced level. Both are primarily for juniors and seniors, but they are open to freshmen and sophomores with an interest or background in the subject of the course.

CLAS 101 Latin and Greek in Current Use (2) VLPA Designed to improve and increase English vocabulary through a study of the Latin and Greek elements in English, with emphasis on words in current literary and scientific use. No auditors. Knowledge of Latin or Greek is not required. Credit/no credit only. Offered: AWPSP.

CLAS 102 Grammar and Syntax through Latin (3) VLPA Improve familiarity with basic grammar, syntax, logic through study of mechanics of the Latin language. For Educational Opportunity Program students only. No auditors. Knowledge of Latin or Greek not required. Credit/no credit only.

CLAS 205 Bioscientific Vocabulary Building From Latin and Greek (3) VLPA Designed to help the student master the scientific vocabulary of his or her particular field by a study of the Latin and Greek roots that are used to create the majority of scientific terms. No auditors. Knowledge of Latin or Greek is not required. Credit/no credit only. Offered: AWPSP.

CLAS 210 Greek and Roman Classics in English (5) VLPA Bliquez, Blundell, Clauss, Colwell, Connors, Gowing, Halleran, Harmon, Hinds, Langdon, MacKay Introduction to classical literature through a study of the major Greek and Latin authors in modern translation. Offered: AWPSP.

CLAS 320 Greek and Roman Private and Public Life (5) VLPA/I&S Bliquez Study of the civic and social practices and institutions of everyday Greek and Roman private and public life, including the family, social classes, the courts and legal systems, military service and war, technology and the trades, money and banking, agriculture and rural life. Many lectures illustrated by slides. Offered: A.

CLAS 322 Intellectual History of Classical Greece (5) VLPA/I&S Blundell Uses Plato's Republic as a core text to explore a range of issues of ancient and contemporary interest, such as justice, political theory, male attitudes toward women, and the nature of the soul. Besides the Republic and other works of Plato, readings are taken from Homer, tragedy, comedy, Aristotle, and others. Offered: Sp.

CLAS 324 Greek and Roman Athletics (3) I&S Langdon Greek and Roman athletic festivals and events, and the place of athletes and sport in ancient society.

CLAS 326 Women in Antiquity (3) VLPA/I&S Colwell, Connors A broad survey of primary sources in medicine, law, philosophy, religious ritual, myth, history, and ethnography, informed by perspectives from literature, art, and archaeology. Provides students the tools to analyze the social roles of women in ancient Greece and Rome.

CLAS 328 Sex, Gender, and Representation in Greek and Roman Literature (3) VLPA/I&S Hinds Affirmation and inversion of gender roles in Greek and Roman literature, myths of male and female heroism; marginalization of female consciousness; interaction of gender, status, and sexual preference in love poetry. Readings from epic, drama, historiography, romance, and lyric.

CLAS 330 The Age of Augustus (5) VLPA/I&S Gowing Detailed study of the history and culture of the reign of Augustus, the first Roman emperor (31 BC-AD 14). Includes readings in Augustan authors such as Virgil, Ovid, and Horace as well as the study of Augustan art and architecture. Offered: jointly with HSTAM 330.

CLAS 399 Study Abroad: Classics (3-15, max. 20) VLPA For participants in Classics overseas study programs. Specific course content determined by assigned faculty member. Credit not applicable to majors in the Classics Department without approval Prerequisite: permission of department Chair.

CLAS 424 The Epic Tradition (5) VLPA Clauss, Halleran, MacKay Ancient and medieval epic and heroic poetry of Europe in English: the Iliad, Odyssey, and Aeneid; the Roland or a comparable work from the medieval oral tradition; pre-Greek forerunners, other Greco-Roman literary epics, and later medieval and Renaissance developments and adaptations of the genre. Choice of reading material varies according to instructor's preference. Offered: jointly with C LIT 424.

CLAS 427 Greek and Roman Tragedy in English (5) VLPA Halleran Study of the development of Greek and Roman tragedy, with extensive readings in representative plays of Aeschylus, Sophocles, Euripides, and Seneca.

CLAS 428 Greek and Roman Comedy in English (3) VLPA Colwell Readings from the comedies of Aristophanes, Plautus, and Terence.

CLAS 430 Greek and Roman Mythology (3/5) VLPA Clauss, Colwell, Connors, Gowing, Halleran, Hinds Principal myths found in classical and later literature. Offered: AWPSP.

CLAS 432 Classical Mythology in Film (3/5) VLPA Clauss Comparison and discussion of classical myths and modern films inspired by them. Promotes access to the reading of classical mythology. Analyzes significant differences between ancient literary and modern cinematographic representations of the myth.

CLAS 435 The Ancient Novel (3) VLPA *Connors* Study of the origins and growth of fiction and the novel in the Latin tradition.

CLAS 445 Greek and Roman Religion (3) VLPA/ I&S *Harmon, Langdon* Religion in the social life of the Greeks and Romans, with emphasis placed on their public rituals and festivals. Attention is given to the priesthoods, personal piety, rituals of purification and healing, and the conflict of religions in the early Roman Empire. Many lectures illustrated by slides. Prerequisite: one course in ancient history, or classics, or religious studies; RELIG 201 preferred. Offered: jointly with RELIG 445.

CLAS 495 Senior Essay (1-3) VLPA Usually written in conjunction with another course in the final year of study in the major.

CLAS 496 Special Topics (2-5, max. 15) VLPA Offered occasionally by visitors or resident faculty.

Greek

GREEK 101, 102, 103 Elementary Greek (5, 5, 5) 101, 102: an intensive study of grammar, with reading and writing of simple Attic prose; 103: reading of selections from classical Greek literature. Prerequisites: 101 for 102, 102 for 103. Offered: A, W, Sp.

GREEK 300, 301 Greek Language, Accelerated (5, 5) Intensive introduction to Attic Greek. Not accepted as upper-division credit toward a major in Greek or classics. Does not satisfy foreign language proficiency requirement. Prerequisites: some previous experience in, or study of, a foreign language for 300; 300 for 301. Offered: W, Sp.

GREEK 305, 306 Attic Prose (5, 5) VLPA Translation of selections from Attic prose; elementary exercises in Attic prose composition. Prerequisites: 103, 301, or equivalents.

GREEK 307 Homer (5) VLPA Translation of selections from the Iliad or the Odyssey; Attic prose composition, metrics. Prerequisite: 306 or equivalent. Offered: Sp.

GREEK 308 Introduction to Koine Greek Texts (3) VLPA *Williams* Reading and discussion of selected religious and philosophical texts from Koine Greek. Prerequisite: 306.

Prerequisite for the following 400-level Greek courses: four years of high school Greek or 307 or permission of undergraduate adviser.

GREEK 413 The Pre-Socratic Philosophers (3) VLPA *Blundell* See above.

GREEK 414 Plato (3) VLPA *Blundell, MacKay* See above. Offered: alternate years; W.

GREEK 415 Aristotle (3) VLPA *Blundell, MacKay* See above. Offered: alternate years; Sp.

GREEK 422 Herodotus and the Persian Wars (3) VLPA *Bliquez, Langdon, MacKay* See above. Offered: alternate years; A.

GREEK 424 Thucydides and the Peloponnesian War (3) VLPA *Bliquez, Langdon* See above. Offered: alternate years; W.

GREEK 426 Attic Orators (3) VLPA *Bliquez, Langdon, MacKay* See above. Offered: alternate years; Sp.

GREEK 442, 443, 444 Greek Drama (3, 3, 3) VLPA *Halleran* See above. Offered: alternate years.

GREEK 449 Greek Epic (3) VLPA *Colwell, Halleran, MacKay* See above. Offered: alternate years; A.

GREEK 451 Lyric Poetry (3) VLPA *Blundell, Colwell, Halleran* See above. Offered: alternate years; W.

GREEK 453 Pindar: The Epinician Odes (3) VLPA *Colwell, Halleran* See above. Offered: alternate years; Sp.

GREEK 461 Early Greek Literature (3-5, max. 15) VLPA Readings and discussion of selected authors of the early Greek period.

GREEK 462 Literature of Classical Athens (3-5, max. 15) VLPA Readings and discussion of selected authors of classical Athens.

GREEK 463 Hellenistic Greek Literature (3-5, max. 15) VLPA *Clauss* Readings and discussion of selected authors of the Hellenistic Age.

GREEK 490 Supervised Study (* max. 18) Special work in literary and philosophical texts for graduates and undergraduates. Prerequisite: permission of undergraduate adviser.

Latin

LATIN 101, 102, 103 Elementary Latin (5, 5, 5) 101, 102: an intensive study of grammar, with reading and writing of simple Latin prose; 103: reading of selections from classical Latin literature. Prerequisites: 101 for 102, 102 for 103. Offered: A, W, Sp.

LATIN 300, 301 Latin Language, Accelerated (5, 5) Intensive introduction to classical Latin. Not accepted as upper-division credit toward a major in Latin or classics. Does not satisfy foreign language proficiency requirement. Prerequisites: some previous experience in, or study of, a foreign language for 300; 300 for 301. Offered: W, Sp.

LATIN 305 Introduction to Latin Literature (5) VLPA Readings in prose and poetry from various Latin authors; elementary exercises in Latin prose composition. Prerequisite: 103 or 301 or equivalent. Offered: A.

LATIN 306 Cicero and Ovid (5) VLPA Readings from the orations of Cicero and the poetry of Ovid; elementary exercises in Latin prose composition. Prerequisite: 305 or equivalent. Offered: W.

LATIN 307 Vergil (5) VLPA Selections from the first six books of the Aeneid; elementary exercises in Latin prose composition or metrics. Prerequisite: 306 or equivalent. Offered: Sp.

LATIN 401 Medieval Latin Literature to 1200 (3) VLPA *Hinds* Texts read in Latin; cultural and historical contexts discussed. Presupposes year and a half of Latin or equivalent. Informal individual guidance available to members of class handling medieval or renaissance Latin texts in their research. Prerequisite: permission of instructor. Offered: alternate years; Sp.

LATIN 402 Later Medieval and Renaissance Latin Literature (3) VLPA *Hinds* Texts read in Latin; cultural and historical contexts discussed. Presupposes year and a half of Latin or equivalent. Informal individual guidance available to members of class handling medieval or renaissance Latin texts in their research. Prerequisite: permission of instructor. Offered: alternate years; Sp.

Prerequisite for the following 400-level Latin courses: four years of high school Latin, or 307, or permission of undergraduate adviser.

LATIN 412 Lucretius (3) VLPA *Blundell* Offered: alternate years.

LATIN 414 Seneca (3) VLPA *Blundell* Offered: alternate years.

LATIN 422 Livy (3) VLPA *Clauss, Gowing* Offered: alternate years; A.

LATIN 423 Cicero and Sallust (3) VLPA *Clauss, Gowing* Offered: alternate years; W.

LATIN 424 Tacitus (3) VLPA *Clauss, Gowing* Offered: alternate years; Sp.

LATIN 447 Roman Lyric (3) VLPA *Clauss, Harmon* Offered: alternate years; A.

LATIN 449 Roman Elegy (3) VLPA *Harmon, Hinds* Offered: alternate years; W.

LATIN 451 Roman Satire (3) VLPA *Connors* Offered: alternate years; Sp.

LATIN 457 Roman Drama (3) VLPA *Blundell, Connors* Offered: alternate years; A.

LATIN 458 Roman Epic (3) VLPA *Clauss, Harmon, Hinds* Offered: alternate years; W.

LATIN 461 Latin Literature of the Republic (3-5, max. 15) VLPA Readings and discussion of selected authors from the era of the Roman Republic.

LATIN 462 Latin Literature of the Augustan Age (3-5, max. 15) VLPA Readings and discussion of selected authors from the Augustan era.

LATIN 463 Latin Literature of the Empire (3-5, max. 15) VLPA Readings and discussion of selected authors from the Roman Empire.

LATIN 465 Roman Topography and Monuments (5, max. 10) VLPA *Clauss, Gowing, Harmon* Study of the material remains of ancient Rome from the archaic period through the imperial age. Reading of source materials and inscriptions in Latin. Conducted in Rome. Offered: Sp.

LATIN 475 Improvement of Teaching: Latin (5) VLPA *Clauss, Gowing* Examination and evaluation of the various methods of teaching Latin; audiovisual aids; testing materials; textbooks; relation of Latin to other languages; Latin derivatives in English vocabulary. Offered: jointly with EDC&I 438; S.

LATIN 476 Caesar and Vergil for High School Teachers (5) VLPA *Clauss, Gowing* Interpretation of the works of Caesar and Vergil, with special reference to the problems of high school teaching. Offered: jointly with EDC&I 439.

LATIN 480 Supervised Study (* max. 18) Special work in literary and philosophical texts for graduates and undergraduates. Prerequisite: permission of undergraduate adviser.

Courses for Graduates Only

Classical Archaeology

CL AR 513 Athenian Topography (5) *Langdon* Detailed consideration of the topography and monuments of ancient Athens from the beginning through the Roman period.

CL AR 541 Seminar in Greek and Roman Art (3) *Langdon* In-depth study of selected topics and problems of the art of ancient Greece and Rome. Offered: jointly with ART H 541.

Classics

CLAS 700 Master's Thesis (*)

CLAS 800 Doctoral Dissertation (*)

Classical Linguistics

CL LI 501 Comparative Phonology of Greek and Latin (5) *Harmon* Phonological developments of Greek and Latin from Indo-European to the classical periods of both languages.

CL LI 503 History of the Greek Language (5) Morphological and syntactical development of the Greek language from Homer through the New Testament; the development of prose and poetic style.

CL LI 505 History of the Latin Language (5) *Harmon* Morphological and syntactical development of the Latin language; the development of Latin as a literary language.

CL LI 506 Italic Dialects (5) *Harmon* Principal remains of the non-Latin languages and dialects of ancient Italy.

Greek

GREEK 500 Grammar and Composition (5) *Bliquez, Blundell, MacKay* Translation of passages from English to Greek for the purpose of acquiring advanced knowledge of the grammar and the style of the classical tongue.

GREEK 501 Homer (5) *Colwell, Halleran* Readings from the *Iliad* or the *Odyssey*.

GREEK 503 Aristophanes (5) *Bliquez* Select comedies.

GREEK 504 Plato (5) *Blundell* The Republic or other dialogues.

GREEK 506 Aristotle (5) *Blundell* Politics and/or Ethics.

GREEK 508 Lysias and Demosthenes (5) *Bliquez, MacKay* Select speeches, oratorical theory, historical questions.

GREEK 510 Greek Historians (5, max. 10) *Bliquez, MacKay* Selections from Herodotus, Thucydides, and/or Xenophon.

GREEK 512 Greek Tragedy (5, max. 10) *Halleran* Aeschylus, Sophocles, and/or Euripides.

GREEK 515 Greek Epigraphy (5) *Langdon* Selected inscriptions from various Greek states and sanctuaries and evidence they provide for religious and social practices, literature, and political history. Classification and editing of inscriptions, and epigraphical techniques.

GREEK 520 Seminar (5, max. 45) *Bliquez, Blundell, Clauss, Colwell, Halleran, Harmon, MacKay*

GREEK 590 Supervised Study (* max. 18) Prerequisite: permission of graduate program coordinator.

GREEK 600 Independent Study or Research (*)

Latin

LATIN 500 Grammar and Composition (5) *Clauss, Gowing, Hinds* Translation of passages from English to Latin for the purpose of acquiring advanced knowledge of the grammar and style of the classical tongue.

LATIN 501 Vergil (5) *Clauss, Harmon, Hinds* The *Aeneid*.

LATIN 502 Horace (5) *Clauss, Harmon* Odes and/or Epistles.

LATIN 503 Plautus and Terence: Early Republican Literature (5) *Blundell, Connors*

LATIN 504 Philosophy at Rome (5) *Blundell* Selected philosophical works of Cicero and other sources for Hellenistic and Roman philosophy.

LATIN 506 Cicero (5) *Gowing* Select speeches, with attention to rhetorical theory and/or letters.

LATIN 508 Silver Latin Literature (5) *Connors, Hinds* Selections from Martial, Lucan, and Petronius.

LATIN 510 Roman Historians (5, max. 10) *Clauss, Gowing* Caesar, Livy, and/or Tacitus.

LATIN 512 Augustan Poetry (5, max. 10) *Clauss, Harmon, Hinds* Vergil's Eclogues and Georgics, Roman elegaic poetry, and/or Ovid's *Metamorphoses* and *Amores*.

LATIN 520 Seminar (5, max. 45) *Blundell, Clauss, Connors, Gowing, Halleran, Harmon, Hinds*

LATIN 565 Seminar in Rome (5, max. 10) *Clauss, Gowing, Harmon* Study of selected topics and authors in Latin literature. Conducted in Rome.

LATIN 590 Supervised Study (* max. 18) Prerequisite: permission of graduate program coordinator.

LATIN 600 Independent Study or Research (*)

Communications

102 Communications

Undergraduate Program

Adviser
118 Communications

The School of Communications offers undergraduate instruction in four fields: new media technologies and policy; international communication; journalism; and institutions and effects.

Bachelor of Arts

Admission Requirements: Sophomore standing (completion of a minimum of 45 college credits). Admission is competitive based on GPA, completion of CMU 200, and application. A 2.50 GPA guarantees consideration, but not acceptance. Students are admitted quarterly; applications and additional information are available in 118 Communication.

Major Requirements: 50 credits in communications, including (1) CMU 200, (2) 30 credits in a primary field, and (3) 15 credits in a secondary field. (Journalism is available only as a primary field.) Each field has additional requirements, listed below.

Primary Fields

New Media Technologies and Policy: CMU 300 and 301. Remaining credits from 400, 401, 402, 403, 404, 427, 440, 445, 451, 463, 489.

International Communication: CMU 320 or 321. Remaining credits from 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 489. Approval for substitute courses taken outside the department (e.g., in area studies) is given on a case by case basis.

Journalism: (Admission to this field requires the successful completion of a proctored written exam.) CMU 360, 361, 362, 440, and 468. One course from 452, 460, 462, 463, 465, 467, 469, 489. One course each in (a) economics, (b) American government, and (c) U. S. history.

Institutions and Effects: 5 credits from CMU 340, 341, 342, 343. Remaining credits from 400, 404, 424, 425, 426, 427, 440, 441, 442, 443, 444, 445, 447, 448, 449, 450, 451, 452, 453, 454, 489.

Secondary Fields

5 credits at the 300 level and 10 credits at the 400 level, all to be selected from the same primary field (excluding journalism and the student's own primary field).

Minor

Minor requirements: A minimum of 25 credits, including CMU 200, one 300-level course, and two 400-level courses.

Graduate Program

Richard B. Kielbowicz, Graduate Program Coordinator

The School of Communications offers programs leading to the degrees of Master of Arts, Doctor of Philosophy, and Master of Communications.

The Master of Arts degree program provides training in research and scholarship and can be either preparation for doctoral study or a terminal degree. A thesis is required.

The Doctor of Philosophy degree program is designed to develop conceptual and methodological capabilities in a substantive area of communication. (Substantive scholarly interests represented in the School may be found in the faculty listing below.) Doctoral students are expected to apply these capabilities as apprentice scholars in the teaching and research functions of the School.

The Master of Communications degree program offers the practicing professional journalist an opportunity to develop a substantive specialty in conjunction with the academic study of communication.

A foreign language, if appropriate to the student's program of study, may be required in the M.A. and Ph.D. programs.

Special Requirements

Full-time students are admitted to programs in the autumn quarter only. All foreign and Ph.D. students must attend full time. February 15 is the deadline for all applicants who wish to be considered for financial support. All required application materials must be received by that date. The deadline for initiating applications for autumn quarter admission is April 1.

Applicants for all programs must submit: official transcripts of all previous study; results of the Graduate Record Examination (from a test taken within the past five years); a letter of intent linking the applicant's vocational objectives to an available graduate program; three letters of recommendation and, where applicable, evidence of fluency in English. The minimum acceptable TOEFL score is 580. Elementary statistics is a prerequisite for all M.A. and Ph.D. students.

Financial Aid

Applications for teaching and research assistantships should be submitted to the School by February 15. Notices of financial aid are sent in most cases on or about April 1.

Research Facilities

The Communications Research Center facilitates the research of the School's graduate students and faculty.

Five laboratories offer word-processing, text-editing, and computing capabilities to facilitate research and computer-assisted instruction. Three of the labs are connected to the University's mainframe computers and Internet for statistical analysis, data-base management, document preparation, and access to worldwide information sources and email. The School has its own closed-circuit television laboratory.

Correspondence and Information

Graduate Program Coordinator
102 Communications, Box 353740
email: dynamite@u.washington.edu

Faculty

Director

Edward P. Bassett

Professors

Bassett, Edward P. * 1989; PhD, 1967, University of Iowa; telecommunication technologies and information dissemination, public opinion, environment.

Carter, Richard Fremont * 1967; PhD, 1957, University of Wisconsin; communications theory, methodology, behavioral analysis.

Edelstein, Alex S. * 1955, (Emeritus); PhD, 1958, University of Minnesota; comparative communication research, public opinion, propaganda, international communication.

Giffard, Charles A. * 1978; PhD, 1968, University of Washington; international news systems, news flow, editing and reporting.

Lang, Gladys Engel * 1984, (Emeritus); PhD, 1954, University of Chicago; political effects of mass media, sociology of art, political movements and crowd behavior.

Lang, Kurt * 1984, (Emeritus); PhD, 1953, University of Chicago; political and social effects of the media on mass communication.

Pember, Don R. * 1969; PhD, 1969, University of Wisconsin; mass media law, First Amendment history.

Shadel, Willard F. 1963, (Emeritus); MA, 1953, University of Michigan; broadcasting.

Stamm, Keith R. * 1973; PhD, 1968, University of Wisconsin; communities and newspapers, new media technology, dynamic models of communication behavior.

Yerxa, Fendall Winston * 1965, (Emeritus); BA, 1936, Hamilton College; editorial journalism.

Associate Professors

Baldasty, Gerald J. * 1974; MA, 1974, University of Wisconsin; PhD, 1978, University of Washington; communications history and law, government-press relations, First Amendment philosophy and theory.

Bowen, Lawrence * 1973; PhD, 1974, University of Wisconsin; commercial communications, media research, consumer information-seeking and -processing behaviors.

Bowes, John E. * 1974; PhD, 1971, Michigan State University; man-machine communication, public opinion, international communication.

Chan, Anthony B. * 1990; PhD, 1980, York University (Canada); history and politics of Pacific Rim communication systems, Canadian studies.

Cranston, Patricia * 1954, (Emeritus); MA, 1954, University of Texas (Austin); broadcast journalism, history, writing and production of docudramas.

Jackson, Kenneth M. * 1974, (Emeritus); PhD, 1970, University of Washington; institutional communications, media research, mass media and public policy, cultural communications.

Kielbowicz, Richard B. * 1984; PhD, 1984, University of Minnesota; communication history/law, impact of technology on press and society, Canadian media.

Samuelson, Merrill * 1962, (Emeritus); PhD, 1960, Stanford University; research methods, processes of reading, patterns in reader selection of new stories.

Simpson, Roger A. * 1968; PhD, 1973, University of Washington; communication history, law of communication, media economics, editorial journalism.

Underwood, Douglas M. 1987; MA, 1974, Ohio State University; editorial journalism, legislative affairs, literature of journalism.

Assistant Professors

Fearn-Banks, Kathleen A. 1990; MS, 1965, University of California (Los Angeles); public affairs, risk communications.

Gromala, Diane J. 1994; MFA, 1990, Yale University; interface design, interactive multimedia, cyberspace and cultural theory.

Heintz-Knowles, Katharine * 1991; PhD, 1991, University of Illinois; influence of family environment on children's uses and interpretations of television content.

Rivenburgh, Nancy * 1989; MS, 1982, Boston University; PhD, 1991, University of Washington; international

communications, the construction of media images of other cultures.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

CMU 200 Introduction to Mass Communication (5) I&S Examines the role mass communication systems play in our society, including their history, structure, processes, and effects. Strong emphasis on major issues in the media today such as violence, stereotyping of images, political campaigns, and other ethical issues.

CMU 300 Basic Concepts of New Media (5) I&S Provides a comprehensive examination of the effects of new, digital media on interpersonal communication, media industries, and media culture. Emphasis on economic, social, political, and aesthetic implications. Provides limited experience with computer-based media. No prior technical computer experience assumed.

CMU 301 Navigating Information Networks for Mass Media (5) Builds familiarity with computer-mediated information networks. Introduces and compares network search engines, agents, browsing/viewing tools and retrieval/transfer software for use by reporters and other media workers. Instruction and practice with searching/acquiring information, its analysis and interpretation, illustration, and write-up. No prior computer or network experience assumed.

CMU 304 The Press and Politics in the United States (5) I&S Journalist's role in elections and public policy. Relationship between news coverage and political campaigns. Study and analysis of local political newswriting, reporting, and response by local and state political figures. Offered: jointly with POL S 304.

CMU 320 Global Communication (5) I&S Introduction to the history, purpose, channels, content, technologies, policy, and regulation of international communications systems. Issues covered include disparities in media development between post-industrial and developing nations, imbalances in international news and information flow, and the emergence of global communications.

CMU 321 Communications in International Relations (5) I&S Looks at communications in relations between international groups and states. Examines the range of functions and roles communication media play in international affairs, global issues, and inter-group relations. Also examines the strategic use of communications by various groups.

CMU 340 History of Mass Communication (5) I&S History and development of communication from prehistoric times; rise of mass media; political and economic context of newspapers, radio, film; and television.

CMU 341 Government and Mass Communications (5) I&S Survey of the contemporary relationship between the American press and the government. After an initial exploration of the development of the First Amendment, specific problems resulting from the intersection of the press and the government are examined, including both legal and political issues.

CMU 342 Media Structure (5) I&S Industrial organization and culture; consumer and producer decisions; public policy toward media; workforce and unions. Media role in culture and political economy.

CMU 343 Effects of Mass Communication (5) I&S Effects of mass communication on individuals and society. Relevant theories applied to research evidence, addressing such topics as effects of stereotypes, violent and sexual imagery, and persuasive messages on our knowledge, attitudes, and behaviors.

CMU 360 Beginning Newswriting and Reporting (4) I&S Introduction to newswriting and reporting for print media. Focus on defining news, general writing skills, constructing leads, preparing a variety of basic journalism news stories, interviewing techniques, covering beats, and journalistic style. Prerequisite: communications major or permission of instructor.

CMU 361 Advanced Reporting and Newswriting (5) I&S In-depth training in the development of advanced-level reporting and newswriting skills. Practice in information gathering, interviewing, use of sources, database analysis, and investigative reporting techniques. Prerequisite: 360.

CMU 362 News Laboratory (5) I&S Newswriting-skills course. Students gain real-world experience by producing news and feature stories for client papers in the Puget Sound Region. Involves considerable one-on-one work with the lecturer/editor. Requires writing and reporting skills.

CMU 363 Communication Internship (2-6, max. 6) Supervised academic work done in connection with editorial internship. Designed to extend the student's knowledge of professional perspectives. Does not apply to required 50 credits in communications. Open only to majors. Credit/no credit only. Prerequisites: permission of instructor.

CMU 382 Introduction to Communication Research (5) I&S Comprehensive introduction to research methods employed in basic and applied communication research, including sample surveys, content analysis, experimentation, and elementary statistics. Offered: jointly with SP CMU 382.

CMU 400 History of Media Technology and Regulation (5) I&S Impact of pre-1980's media technologies—printing, telecommunications, broadcasting, photography, and more—on individuals and institutions, especially government, business, and the mass media. How laws and policies have changed to govern new media forms.

CMU 401 Telecommunication Policy and Convergent Media (5) I&S Examines contemporary media and telecommunications industries since 1980 and their accelerating convergence. Attention given to economic, policy, and mass use issues. Review of major industry leaders, promising technologies, and new services. Social issues, government initiatives, and new legislation covered for both North American and international markets.

CMU 402 New Media as Virtual Communities (5) I&S Technologically-mediated virtual communities considered through analysis of historical precedents and influences and through an exploration of the concept of community. Issues include a focus on social interactions: the social, political, economic, and technological contexts of virtual communities and the limits for their sustenance.

CMU 403 Visual Literacy for Mass Communication (5) I&S Overview of how we apprehend, interpret, and understand visual content of traditional and evolving media forms. Emphasis on analytic methods, the aesthetic characteristics of media forms and how visual are utilized and understood. Several perspectives considered, including historical, cultural, and critical.

CMU 404 New Media Criticism (5) I&S Examines critically the content of new media forms, contrasting them with traditional media. Stresses influences of social, economic, political, and technological forces on content and developing strategies for critical analysis. Prerequisite: 301 or permission of instructor.

CMU 418 Issues in Mass Communication (5, max. 10) I&S Topics vary. Recommended: background in social sciences.

CMU 420 Comparative Media Systems (5) I&S Provides students an understanding of policies that

shape national communication processes and systems. Uses comparative analysis to identify both similarities and differences among media structures of nations at different levels of development. Primary emphasis on broadcast media. Offered: jointly with SIS 419.

CMU 421 Intercultural Communication (5) I&S Investigates intercultural communication theory and its application for varying levels of human interaction: interpersonal, intergroup, and international. Recommended: SP CMU 384. Offered: jointly with SP CMU 478.

CMU 422 Culture in International Communications Research (5) I&S Examines research that deals with or compares data from different countries, cultures, or sub-cultures. For methodological issues and potential pitfalls due to variability in language, culture, geo-political orientation.

CMU 423 Communications and Development (5) I&S Examines both theory and application involved in using communications media as a tool for addressing political, social, and economic development issues. Utilizes a case study approach to look at localized applications of traditional and new communications tools in the pursuit of sustainable development.

CMU 424 Canadian Media Systems (5) I&S Structure and operation of Canadian mass media and telecommunications industries. Impact of United States media on Canadian culture. Role of domestic media in lives of minorities. Laws and policies governing communications. Offered: jointly with SISCA 424.

CMU 425 European Media Systems (5) I&S Examines media systems in selected countries in Europe and policy issues that link (or divide) members of the European Union and other major media producers. Media studied in context of the contemporary economic, social, political, and cultural milieu in which they operate. Offered: jointly with EURO 425.

CMU 426 International Media Images (5) I&S Ways in which media construct images of international peoples and events. Develops a set of critical tools for assessing media portrayals of international affairs and cultures.

CMU 427 International Communications Law and Policy (5) I&S Examines the international and comparative aspects of traditional press law, broadcast regulation, and telecommunications policy. Also examines freedom of the press in international reporting and the efforts of countries to limit foreign media influences within their borders.

CMU 428 Asian Media Systems (5) I&S Examines the media systems and communication policies in selected Asian countries. Identifies and analyzes the cultural, economic, historical, and political parameters that influence these media.

CMU 429 Chinese Communications Systems (5) I&S Analyzes the economic, historical, intellectual, social, and political foundations of communications systems in the region of Chinese Asia: China, Hong Kong, Singapore, and Taiwan. Focus primarily on print and broadcast journalism.

CMU 440 Mass Media Law (5) I&S Survey of laws and regulations that affect the print and broadcast media. Includes material on First Amendment, libel, invasion of privacy, freedom of information, copyright, obscenity, advertising and broadcast regulation, and matters relating to press coverage of the judicial system.

CMU 441 United States Media History (5) I&S Development of mass communication in the United States with emphasis on role of mass media in politics, economics, gender, and race.

CMU 442 Public Opinion and the Mass Media: Processes and Methods (5) I&S Considers public

opinion in the United States as formed and affected by the mass media. Two themes stressed are historical and institutional use of public opinion and the political influence of the media. Attention given to public opinion measurement by the mass media, political candidates, and governmental institutions.

CMU 443 Advertising and Society (5) I&S Examination of the social and economic role of advertising as an institution in contemporary society with special attention to controls over advertising. Emphasis placed on current ethical issues such as the portrayal of women and minorities in advertising, cigarette and alcohol advertising, and political advertising.

CMU 444 Public Relations and Society (5) I&S Overview of issues, strategies, and role of public relations professionals in various areas of American society, including media relations, government relations, community affairs, and consumer relations.

CMU 445 Communication Theory (5) I&S Centrality of communication and mass communication in behavior and society. Problems of, and questions about, communicative effectiveness. Theoretical principles applicable to communicative effectiveness. Communication's six contributions to effective behavior.

CMU 447 Theory and Criticism of Broadcasting (5) I&S Application of critical standards to the sociological functions and esthetic elements of broadcast media. Recommended: relevant courses in the social sciences or humanities.

CMU 448 Advertising Process and Effects (5) I&S Examines the history, structure, operations, and impacts of advertising in self-service marketplace economies.

CMU 449 Public Information Campaigns (5) I&S Examines the theory and design of public communications campaigns. Analyzes current campaign research and practice and reviews policy implications.

CMU 450 Communications and Consumer Behavior (5) I&S Examines conceptual and empirical relationships between consumer information processing/choice behaviors and mass communications.

CMU 451 Mass Media and Culture (5) I&S Empirical and theoretical framework for analyzing role of mass media in cultural change. Historical and contemporary cases consider ethnic, gender, class, and urban-rural conflicts and cultural roles of sports, elections, and national rituals. Focus on visual electronic media.

CMU 452 Crisis Communications (5) I&S Study of the functions of communications professionals during crises. Covers public relations professionals as advocates for organizations and companies in crisis and the news media as advocates of the mass public. Discussion of cases.

CMU 453 Children and Electronic Media (5) I&S Examines research on children and electronic media (television, video games, computers). Topics include regulation of children's media, developmental differences in children's processing of mediated information, impact of violent content on aggressive behavior, impact of advertising on consumer socialization, stereotypes and self-image, commercialization of children's culture.

CMU 454 Problems in Communication Research (5) I&S Communication theory and research methods applied to solving significant societal problems, e.g., effectiveness of democratic government, poverty, pollution, overpopulation.

CMU 460 Special Reporting Topics (4) I&S Topics vary. Prerequisite: communications major and 361.

CMU 462 Magazine Writing (5) I&S Techniques of writing and marketing the full-length magazine article.

CMU 463 Copy Editing and Design (5) I&S Focus on editing copy for publications, covering grammar and style, production methods, news criteria, use of wire services, headlines, make-up and design, pagination, and online publication.

CMU 467 Journalism and Literature (5) I&S Explores the relationship between journalism and fiction writing in the United States. Examines writers who began their careers as journalists and forged a fiction-writing philosophy related to what they learned in journalism. Readings in fiction and journalism.

CMU 468 Journalism Ethics (5) I&S *Simpson* Provides a method and substantive context based on ethical theory, media history, and value systems analysis for analyzing and resolving dilemmas raised by journalistic practices.

CMU 469 Intellectual Foundations of American Journalism (5) I&S Examines the thinkers and philosophers who have influenced modern journalism. Studies the main ideas in the development of world thought and their impact on today's journalists. Explores the role communications systems have played in the creation of the world's cultures.

CMU 489 Ethnicity, Gender, and Media (5) I&S Media portrayal of women and people of color; creation of alternative media systems by women and people of color in the United States. Offered: jointly with AES/WOMEN 489.

CMU 498 Problems of Communications (1-5, max. 10) Research and individual study. Prerequisite: permission of instructor.

Courses for Graduates Only

CMU 500 Seminar in Theory of Communication (5) Procedures for analyzing concepts and theoretical material to provide basis for one's research. How to make productive use of the literature. Procedures for theorizing about empirical findings and generalizations. Typologies, models, theories, laws, and working hypotheses. Prerequisite: permission of instructor.

CMU 501 Development of Mass Communication (5) Institutions of mass communication. Political and social roles.

CMU 502 Mass Communication Process and its Effects (5) Analytic approach to conceptualization and research in the field since 1900.

CMU 503 Research Methods (5) Introduces and compares basic methods of research in communications.

CMU 505 Communication and Politics (3) Primary literature dealing with communication and American political behavior. Prerequisite: 421.

CMU 506 Critical Theory Applications in Mass Communication (5) Major approaches in critical theory: Marxism, psychoanalysis, structuralism, and semiology. Synthesizes these approaches by viewing the "cultural studies" tradition. Assesses critical theory through empirical study of network television in the United States and the United Kingdom.

CMU 507 Computer Applications in Communication Research (3) Potential of the computer for use in behavioral science. Prerequisites: elementary programming, elementary statistics.

CMU 508, 509 Communication Research (5, 5) Basic methodological questions in communication research. Foundations in history and philosophy of science. Prerequisite: permission of instructor.

CMU 511 Seminar in Communication Research (3, max. 15) Individual research projects undertaken collectively within a given area of study, under direction of faculty member. Prerequisite: permission of instructor.

CMU 512 Content Analysis (5) Content analysis as a technique for making inferences from texts, including traditional, manual methods of analysis and computer coding.

CMU 513 Survey Research Methods in Communications (5) Faculty-directed project in survey research in which basic principles of survey design, including sampling, observation, measurement, data analysis, and data interpretation, are all applied. Prerequisite: elementary statistics or permission of instructor.

CMU 515 Field Seminar in Communication History (5) Readings in communications history.

CMU 516 Communications History Research Methods (5) Development of the historical approach to communications research. Study of historical methods, bibliography, and criticism.

CMU 517 Seminar in Communications History (5) Topical research seminar in communications history.

CMU 518 Seminar in Special Topics in Mass Communications (5, max. 10)

CMU 519 Seminar in Government and Mass Communications (5) Legal problems of mass communication, institutions, and media operations.

CMU 521 Seminar in Media Structure (5) Directed independent research into structural aspects of American mass communications. Prerequisite: graduate standing.

CMU 543 Seminar in Advertising in Society (3) Interacting historical, social, economic, and legal influences shaping institutional character. Prerequisite: permission of instructor.

CMU 547 Seminar in Communication and Consumer Behavior (3) Directed reading and research in communication and consumer behavior. Emphasis on conceptualization and original research. Prerequisite: permission of instructor.

CMU 550 Advanced Communication Methods (1-3) Directed individual projects at a level acceptable by print or broadcast media. Advanced techniques of research and production analyzed and applied. Open only to students seeking the Master in Communications degree.

CMU 570 Seminar in the Theory and Criticism of Broadcasting (3) Criticism of the function and performance of broadcasting. Use of primary sources, including systematic data gathering and analysis. Prerequisite: 470.

CMU 571 Seminar in Regional Communication Systems (5) Communication as a factor in economic, sociocultural, and political relations among nations of a region. Focus varies with specialization of instructor. Consult graduate secretary for details. Interdisciplinary focus.

CMU 575 Seminar in International Communication Systems (3) International communications and contemporary issues that affect the functioning of global communication systems. Interdisciplinary focus.

CMU 577 Seminar in International Communications Research (5) Methodological issues particular to the design or analysis of research that deals with data from different countries, cultures, or sub-cultures. Prerequisite: 503 or equivalent.

CMU 579 Seminar in Media and Foreign Policy (5) The role of communications media in how nations interact. The media as source, actor, and catalyst in international affairs. Interdisciplinary focus.

CMU 581 Seminar in Public Opinion and Communication (5) Conceptual and methodological approaches to public opinion and communication as historical and behavioral phenomena. United States

and international perspectives. Recommended: appropriate background in the social sciences.

CMU 586 Telecommunications Structure and Policies (3) Structures and policies governing the functioning of communication technologies and data flow: United States and international perspectives. Interdisciplinary approach.

CMU 596 Effective Teaching of Communications (1) Development of effective teaching and professional skills. Emphasizes interactive teaching, leading discussions, lecturing, planning courses, evaluating resource materials, grading and evaluation, teaching philosophies, and effective classroom management and communications. Required of all graduate students who accept teaching assistantships.

CMU 597 Practicum in Communication Research (1-3, max. 6) Student participation in faculty-directed research projects.

CMU 598 Selected Readings (1-5, max. 10) Prerequisite: permission of supervisory committee chairperson.

CMU 600 Independent Study or Research (*) Prerequisite: permission of supervisory committee chairperson.

CMU 700 Master's Thesis (*)

CMU 800 Doctoral Dissertation (*)

Comparative History of Ideas

B102D Padelford

Comparative history of ideas provides for the interdisciplinary study of intellectual history by bringing together thematically related courses from such fields as literature, history, anthropology, philosophy, the arts, and religious studies. Courses within the program have been chosen and designed to explore the history of specific ideas or themes, to examine the history of particular intellectual cultures (Western and non-Western), or to study comparatively the underlying assumptions and attitudes of different intellectual worlds. As a unique approach to liberal humanistic studies, the program provides a solid basis for postgraduate study in, for example, law, administration, medicine, education, journalism, or area studies.

Undergraduate Program

Bachelor of Arts

Major Requirements: 55 credits with a 2.50 GPA to include colloquium in the history of ideas, six core courses distributed in three areas, and the remaining credits chosen among approved electives. At least half the credits presented for the major must be at the upper-division level. An optional senior thesis requiring an additional 15 credits is available.

Minor

Minor Requirements: 30 credits to include 5 credits in Group A; 5 credits in Group B, subgroup 1; 5 credits in Group B, subgroup 2; 5 credits in Group C; CHID 390 (5 credits); CHID 498 (5 credits). See department for current lists of Group A, B, and C courses.

Faculty

Chair

John E. Toews

Professors

Behler, Ernst H. * 1965; PhD, 1951, University of Munich (Germany); romanticism, literary theory, history of criticism.

Posnock, Ross * 1983; PhD, 1980, Johns Hopkins University; American literature.

Toews, John E. * 1979; PhD, 1973, Harvard University; modern European intellectual history.

Webb, Eugene * 1966; PhD, 1965, Columbia University; modern English, French, and German literature, comparative religion.

Associate Professors

Blundell, Mary Whitlock * 1985; PhD, 1984, University of California (Berkeley); Greek and Roman philosophy and literature.

Collins, Douglas P. * 1980; PhD, 1978, University of Missouri; twentieth-century French literature.

Mish'alani, James K. * 1963; PhD, 1961, Brown University; ethics, philosophical anthropology, contemporary continental philosophy.

Searle, Leroy F. * 1977; MA, 1968, PhD, 1970, University of Iowa; twentieth-century literature, critical theory, American studies.

Lecturers

Clowes, James E. 1994; MA, 1988, University of Montana; modern European intellectual history, early German Romanticism, pedagogy.

Shabetal, Karen J. 1984; MA, 1982, PhD, 1984, University of California (San Diego); eighteenth-century literature, romanticism.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

CHID 110 The Question of Human Nature (5)
VLPA/ISS Clowes Considers the relationship between the individual and his/her culture. Traces the evolution of the notion of human nature in Europe and the United States and compares this tradition with representations of the human being from other cultural traditions.

CHID 205 Method, Imagination, and Inquiry (5)
VLPA Examines ideas of method and imagination in a variety of texts, in literature, philosophy, and science. Particularly concerned with intellectual backgrounds and methods of inquiry that have shaped modern Western literature. Offered: jointly with ENGL 205.

CHID 207 Introduction to Intellectual History (5)
I&S Ideas in historical context. Comparative and developmental analysis of Western conceptions of "community," from Plato to Freud. Offered: jointly with HIST 207.

CHID 380 The Nature of Religion and Its Study (5)
I&S Jaffee, Webb Study of religion as a general human phenomenon. Manner in which different methods of inquiry (phenomenology, anthropology, sociology, psychology, literary criticism, archaeology, philosophy, theology) illuminate different aspects of religion and shape our conceptions of its nature. Recommended: RELIG 201 or 202 or other courses in history of religious traditions. Offered: jointly with RELIG 380.

CHID 390 Colloquium in the History of Ideas (5)
I&S Basic theoretical issues in the comparative history of ideas as a disciplined mode of inquiry; examination of representative historical figures and problems. Primarily for majors; open to nonmajors by permission of program adviser.

CHID 491-492-493 Senior Thesis (5-5-5) I&S 491-493: critical and methodological issues. 492-493: research and writing of thesis under supervision of a faculty member. Required of candidates for an honors degree; available to others with permission of program adviser. Prerequisite: 390.

CHID 496 Focus Groups (1-2 max. 4) - Credit/no credit only.

CHID 497 Peer Facilitators (5)

CHID 488 Special Colloquia (1-5 max. 20) I&S Each colloquium examines a different subject or problem from a comparative framework. A list of topics is available from the CHID office.

CHID 489 Undergraduate Independent Study or Research (1-5 max. 10) Supervised independent study for students who wish to pursue topics not available in regular course offerings. Prerequisite: permission of program adviser.

Comparative Literature

B531 Padelford

The comparative literature program transcends the confines of a national literature and explores the relationships among several literatures. In addition, the program is concerned with the relationship of literature to the arts and to such fields of knowledge as philosophy, religion, and political thought. Typical areas of inquiry include literary traditions and periods, motifs, genres; patterns of influence and reception of literary works among national cultures; and the general principles of literary theory and criticism.

Undergraduate Program

Adviser
Willis Konick
B524 Padelford

Bachelor of Arts

Major Requirements: 50 credits, to include C LIT 300, 400, and one course from among C LIT 320, 321, 322, and 323, and three additional courses in comparative literature at the 300 or 400 level; and at least one course in a literature, studied in the original tongue, other than the student's native language. Remaining credits are to be earned, with few exceptions, in 300- and 400-level courses from among the offerings of Comparative Literature and the following participating departments: Asian Languages and Literature, Classics, English, French and Italian Studies, Germanics, Near Eastern Languages and Civilization, Scandinavian Languages and Literature, Slavic Languages and Literature, and Spanish and Portuguese Studies. Departmental courses in foreign literature in translation are listed under the respective departments.

Minor

Minor Requirements: 30 credits to include C LIT 300, 400, and one course from among C LIT 320, 321, 322, and 323; an upper-division literature course in a language other than the student's native language; and the remaining credits in upper-division literature courses offered through Comparative Literature and the participating departments above.

Graduate Program

The Department of Comparative Literature offers a program of study with faculty members from the following participating departments: Asian Languages and Literature, Classics, English, French and Italian Studies,

Germanics, Near Eastern Languages and Civilization, Scandinavian Languages and Literature, Slavic Languages and Literature, and Spanish and Portuguese Studies. Study in this program leads to a Master of Arts or Doctor of Philosophy degree. Students concentrate on graduate courses in comparative literature and specialize in two or more national literatures of major interest to them, studied in the original language. With permission, a Ph.D. aspirant may choose as a third area of study a field outside of literature (e.g., philosophy, religion, art, political thought). On receiving the advanced degree, the student is qualified for teaching and research in comparative and general literature, as well as the language and literature of his or her specialization.

Special Requirements

Applicants for the M.A. program are required to have a B.A. degree in comparative literature, English, or any foreign literature, or an equivalent background; applicants for the Ph.D. program are required to have an M.A. in one of the above. M.A. students are required to demonstrate advanced competence in one foreign language and a basic reading knowledge of a second. Ph.D. students are required to demonstrate advanced competence in two foreign languages and a basic reading knowledge of a third. Advanced competence usually must be demonstrated upon admission to the program, and the reading knowledge is required before M.A. or Ph.D. examinations are administered. Language competence is evaluated by comparative literature faculty through departmental examinations or by evidence of completion of satisfactory advanced (400- or 500-level) course work in the language.

Ph.D. Program in Critical Theory

This is a joint-doctoral program with ten participating doctoral programs (Asian Languages and Literature; Classics; Comparative Literature; Drama; English; Germanics; French and Italian Studies; Scandinavian Languages and Literature; Slavic Languages and Literature; Spanish and Portuguese Studies; and Speech Communication). The program combines the doctoral program in one of the participating departments with an *additional* set of courses in critical theory into an integrated course of study. The purpose is to broaden a student's perspective and to increase awareness of different critical approaches to literature and related fields. Study in this program leads to a Ph.D. in the respective major field and critical theory.

Admission Requirements

Applicants must have been admitted to one of the participating departments and have received a Master's degree in a subject represented by these departments or in a related field.

Degree Requirements

(1) Continued satisfactory work in the student's home department; (2) completion of six graduate courses from the program in critical theory; (3) completion of one colloquium in critical theory; (4) reading knowledge of two foreign languages, ancient or modern; (5) passage of the written Ph.D. examinations in the student's home department; (6) passage of the oral Ph.D. examination in the student's home department; (7) acceptance of a dissertation prospectus by the dissertation committee, which should have two faculty members from the program in critical theory; (8) completion and acceptance of a Ph.D. dissertation and passage of the oral defense before the dissertation committee.

Financial Aid

Students working for advanced degrees in comparative literature are eligible to apply for teaching assistantships in the department(s) of language and literature relevant to their specialization. Comparative literature has a very limited number of teaching assistantships available and they are usually awarded to advanced students.

Correspondence and Information

Graduate Program Coordinator
B531 Padelford, Box 354338
comp11t@u.washington.edu

Faculty

Chair

Ernst H. Behler

Professors

Adams, Hazard S. * 1977; MA, 1949, PhD, 1953, University of Washington; romanticism, history of literary theory, Anglo-Irish literature.

Behler, Diana I. * 1971; MA, 1966, PhD, 1970, University of Washington; romanticism, nineteenth century, comparative literature.

Behler, Ernst H. * 1965; PhD, 1951, University of Munich (Germany); romanticism, literary theory, history of criticism.

Borch-Jacobsen, Mikkel * 1986; Doct, 1981, University of Strasbourg (France); French twentieth-century literature, modern philosophy, psycho-analysis.

Brown, Jane K. * 1988; PhD, 1971, Yale University; seventeenth, eighteenth and nineteenth century, comparative literature.

Brown, Marshall J. * 1988; PhD, 1972, Yale University; 18th and 19th-century literature, literary theory, music and literature.

Hruby, Antonin F. * 1961, (Emeritus); PhD, 1946, Charles University Czechoslovakia; medieval literature, comparative literature.

Jaeger, C. Stephen * 1985; PhD, 1970, University of California (Berkeley); medieval German and Latin literature, medieval intellectual history, comparative literature.

Leiner, Jacqueline * 1963, (Emeritus); Dr ès Lettres, 1969, University of Strasbourg (France); modern French literature.

Leiner, Wolfgang * 1963, (Emeritus); PhD, 1955, University of Saarland; seventeenth- and twentieth-century French and Italian literature.

MacKay, Pierre A. * 1966, (Emeritus); PhD, 1964, University of California (Berkeley); Greek literature, post-classical and Byzantine Greek literature, numismatics.

Modiano, Raimonda * 1978; PhD, 1973, University of California (San Diego); romanticism.

Reinert, Otto * 1956, (Emeritus); PhD, 1952, Yale University; comparative literature, eighteenth-century literature.

Shapiro, Steven * 1984; PhD, 1981, Yale University; literary theory, romantic poetry, post-modernism.

Steene, Birgitta * 1973, (Emeritus); PhD, 1960, University of Washington; Scandinavian drama and film, children's literature, comparative literature.

Vance, Eugene * 1990; PhD, 1964, Cornell University; medieval literature, the history of criticism, and discourse analysis.

Wang, Ching-Hsien * 1971; PhD, 1971, University of California (Berkeley); Chinese poetry and comparative literature.

Webb, Eugene * 1966; PhD, 1965, Columbia University; modern English, French, and German literature, comparative religion.

Ziaqeh, Farhat J. * 1966, (Emeritus); LLB, 1940, University of London (UK); Arabic language and literature, Islamic law, Islamic institutions.

Associate Professors

Ammerlaan, Heilmut H. * 1968; MA, 1960, University of Vermont; PhD, 1965, University of Texas (Austin); Goethe, eighteenth to early twentieth century, comparative literature.

Collins, Douglas P. * 1980; PhD, 1978, University of Missouri; twentieth-century French literature.

Elrich, Robert J. * 1964, (Emeritus); PhD, 1960, Harvard University; eighteenth-century French literature.

Geist, Anthony L. * 1987; PhD, 1978, University of California (Berkeley); twentieth century Spanish literature: ideology and literary form.

Handwerk, Gary J. * 1984; PhD, 1984, Brown University; literary theory, English and Irish nineteenth- and twentieth-century narrative.

Konick, Willis * 1950; PhD, 1964, University of Washington; Russian literature, nineteenth-century European literature.

Kramer, Karl D. * 1970; PhD, 1964, University of Washington; Russian literature.

McLean, Sammy K. * 1967, (Emeritus); PhD, 1963, University of Michigan; Western drama, twentieth-century poetry, psychoanalysis and literature, translation.

Searle, Leroy F. * 1977; MA, 1968, PhD, 1970, University of Iowa; twentieth-century literature, critical theory, American studies.

Vaughan, Miceal F. * 1973; PhD, 1973, MA, 1973, Cornell University; medieval language and literature.

Warne, Lars G. * 1975, (Emeritus); PhD, 1974, University of California (Berkeley); Swedish language and literature, Scandinavian novel, comparative literature.

Senior Lecturer

Dornbush, Jean M. * 1980; PhD, 1976, Princeton University; medieval period, symbolist poetry, modern literary theory.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

All Comparative Literature courses are taught in English unless otherwise indicated. It is recommended that students enrolling in 300- or 400-level courses have taken 10-15 credits in literature or general humanities courses. Content of many courses varies from quarter to quarter.

C LIT 200 Introduction to Literature (3/5) VLPA Reading, understanding, and enjoying literature from various countries, in different forms of expression (e.g., dramatic, lyric, narrative, rhetorical) and of representative periods. Emphasis on the comparative study of themes and motifs common to many literatures of the world. Offered: A.

C LIT 210 Literature and Science (5, max. 15) VLPA Introduces the rich and complex relationship between science and literature from the seventeenth century to the present day. Students examine selected literary, scientific, and philosophical texts, considering ways in which literature and science can be viewed as forms of imaginative activity.

C LIT 211 Literature and Culture (5, max. 15) VLPA Study of literature in its relation to culture. Focuses on literature as a cultural institution, directly related to the construction of individual identity and the dissemination and critique of values.

C LIT 230 Introduction to Folklore Studies (5) VLPA/IS Comprehensive overview of the field of folkloristics, focusing on verbal genres, customs, belief, and material culture. Particular attention to the

issues of community, identity, and ethnicity. Offered: jointly with SCAND 230.

C LIT 240 Writing in Comparative Literature (5, max. 15) C Comparative approach to literature and a workshop in writing comparative papers in English. Emphasis on cross-cultural comparison of literary works. Readings in English with an option to read selected texts in the original languages Offered: AWSp.

C LIT 270 The Visual Text: How to Read a Film (5) VLPA Introduction to film form, style, and techniques. Examples from silent film and from contemporary film. 270, 271, 272 are designed to be taken as a sequence, but may be taken individually.

C LIT 271 The Visual Text: Authors of Film (5) VLPA Introduction to authorship in the cinema. The work of a major director or directors. 270, 271, 272 are designed to be taken as a sequence, but may be taken individually.

C LIT 272 The Visual Text: Genre in Film (5) VLPA Introduction to study of film genre. Literary, mythic, and historic aspects of film genre. 270, 271, 272 are designed to be taken as a sequence, but may be taken individually.

C LIT 280, 281 The Medieval World: Social, Religious, Intellectual Life in the Middle Ages (5, 6) VLPA A broadly comparative introduction to medieval culture drawing on literature, philosophy, history, art, and music. Varying topics and faculty.

C LIT 300 The Scope of Literary History (5) VLPA Raises the issue of literary history by discussing, through historical examples and theoretical issues, such questions as: What is the scope of written literary history? How do we set up the canon of literary history? How do we account for periodization and epochal change? Offered: W.

C LIT 320 Studies in European Literature (5, max. 15) VLPA Examination of the development of European literature in a variety of genres and periods. Possible areas of study include literature from romantic fiction of early nineteenth century through great realist classics of second half of the century or from symbolism to expressionism and existentialism.

C LIT 321 Studies in Literature of the Americas (5, max. 15) VLPA Emphasizes connections between twentieth century literature of the United States and Canada and current literature of Latin America. Emphasizes that, despite obvious differences, much is shared in terms of culture and national sensibility across the two continents.

C LIT 322 Studies in Asian and Western Literatures (5) VLPA Topics designated by individual instructors.

C LIT 323 Studies in the Literature of Emerging Nations (5, max. 15) VLPA Novels and short stories, from Africa, the Middle East, and South Asia. Discusses relationship of Western literary genres to an oral literary tradition, as well as issues like colonialism, gender relations, narrative technique, native and non-native languages.

C LIT 330 The European Fairy Tale (5) VLPA An introduction to folktales and literary tales from various traditions and periods. A discussion of their origin, special characteristics, dissemination, and relevance to the contemporary reader.

C LIT 331 Folk Narrative (5) VLPA Survey of various genres of folk narratives studied in performance contexts to reveal their socio-cultural functions in a variety of milieu. Theory and history of folk narrative study, taxonomy, genre classification, and interpretative approaches. Recommended: 230/SCAND 230 or equivalent. Offered: jointly with SCAND 331.

C LIT 332 Folk Belief and World View (5) VLPA Study of folk belief and world view expressed in

memorata, legends, magic formulas, and other examples of oral tradition. Analysis of forms and origins of belief genres, their esthetic and social functions, and the role of oral tradition as a tool of social control and change. Offered: jointly with SCAND 332.

C LIT 333 Folklife and Material Culture (5) VLPA Material culture in traditional and contemporary Scandinavia. Comprehensive examination of nonverbal genres (including vernacular architecture, settlement, textile foodways) with an emphasis on broad theoretical issues such as: community, identity, ethnicity. Recommended: 230/C LIT 230 or equivalent. Offered: jointly with SCAND 333.

C LIT 350 Themes in World Literature: Parents and Children (5) VLPA World literature, from the Renaissance to modern times, based upon the theme of "parents and children." Selections drawn from European, English, and American literature, not limited to period and genre. Focus upon the motive of generational conflict. Offered: A.

C LIT 351 Themes in World Literature: Love, Sex, and Murder (5) VLPA World literature, from the Renaissance to modern times, based upon the theme of "love, sex, and murder." Selections drawn from European, English, and American literature, not limited to period and genre. Focus upon the human potential for both great violence and extraordinary compassion. Offered: W.

C LIT 352 Themes in World Literature: Death and Transfiguration (5) VLPA Theme of death, transfiguration, and new life in world literature. Selections from Tolstoy, D. H. Lawrence, Celine, E. M. Forster, and other major writers. Offered: Sp.

C LIT 357 Literature and Film (3-5, max. 10) VLPA The film as an art form, with particular reference to the literary dimension of film and to the interaction of literature with the other artistic media employed in the form. Films are shown as an integral part of the course. Content varies.

C LIT 371 Literature and the Visual Arts (5) VLPA Focuses on specific theoretical problems. Examines the relationship between text and image in a variety of art forms including poetry, novels, paintings, photography, essays, comic strips, film, and advertisement. Readings, in English, from a wide variety of national literatures.

C LIT 375 Images of Women in Literature (5, max. 15) VLPA Comparative study of the ways women's image, social role, and psychology have been portrayed by writers of various nationalities and literary periods. Selection of theme varies from quarter to quarter. Works are read in English translation.

C LIT 398 Special Studies in Comparative Literature (3-5, max. 10) VLPA Offered by visitors or resident faculty. Content varies.

C LIT 400 Introduction to the Theory of Literature (5) VLPA A selection of major theoretical statements in the history of literary theory, with emphasis on fundamental issues of lasting concern and with attention to some recent emphases. Offered: Sp.

C LIT 410 Studies in Literary History (5, max. 15) VLPA Introduction to a major figure or movement associated with the development of literary history. Through the study of one aspect of literary history students gain a thorough understanding of a particular point of view, while exploring the breadth of contemporary approaches to literature.

C LIT 421 Studies in Connections: Literature and other Disciplines (5, max. 15) VLPA Examines the links between literature and other disciplines or art forms. Literature and history, literature and philosophy, literature and music, literature and the visual arts are all appropriate topics. Selection of focus depends on instructor.

C LIT 422 Studies in Genre (5) VLPA Major genres of world literature: poetry, fiction, drama. Readings, in English from a wide selection of national literatures.

C LIT 424 The Epic Tradition (5) VLPA Ancient and medieval epic and heroic poetry of Europe in English: the Iliad, Odyssey, and Aeneid; the Roland or a comparable work from the medieval oral tradition; pre-Greek forerunners, other Greco-Roman literary epics, and later medieval and Renaissance developments and adaptations of the genre. Choice of reading material varies. Literary background recommended. Offered: jointly with CLAS 424.

C LIT 430 Readings in Folklore (5) VLPA Exploration of theoretical and methodological issues in folklore studies through independent reading of journal articles published during the last five years. Prerequisite: C LIT/SCAND 230 or equivalent. Offered: jointly with SCAND 430.

C LIT 470 Senior Seminar in Folklore (5) VLPA Investigates ethnic and several American folk traditions in the Pacific Northwest through extensive fieldwork. Prerequisite: C LIT/SCAND 230 or equivalent. Offered: jointly with SCAND 470.

C LIT 490 Directed Study or Research (1-5, max. 10) Individual study of topics in comparative literature by arrangement with the instructor and the Comparative Literature office.

C LIT 493 Comparative Literature Honors Seminar (5, max. 15) VLPA Special topics in comparative literature. Required of honors students in comparative literature. Prerequisite: permission of honors adviser.

C LIT 495 Honors Thesis (4) VLPA Preparation of an honors thesis under the direction and supervision of a faculty member. Prerequisites: 493 and permission of honors adviser.

C LIT 496 Special Studies in Comparative Literature (3-5, max. 15) VLPA Offered occasionally by visitors or resident faculty. Content varies.

Courses for Graduates Only

Consult the Comparative Literature office for information on the quarter and year the courses below will be offered. Graduate-level course numbers merely distinguish courses and do not indicate ascending level of knowledge required to take the course. Reading knowledge of at least one foreign language recommended.

C LIT 500 The Theory of Literature I: The Literary Text (5, max. 15) An investigation into the nature of literature in contrast to other forms of writing and into essential features of literature such as genres, imagery, modes of communication, and structure.

C LIT 501 The Theory of Literature II: History of Literature (5, max. 15) An exploration of topics of literary history such as periods, traditions, the writing of literary history, and literary history in contrast to other histories.

C LIT 502 The Theory of Literature III: Special Topics (5, max. 15) Offerings vary to cover topics such as individual theorists, theoretical movements, or the intersection of literary theory with other disciplines or arts (psychoanalysis, structuralism, ethics, aesthetics).

C LIT 507 History of Literary Criticism and Theory I (5, max. 15) A general introduction to the major issues in the history of criticism followed by the study of the classical theorists, including Plato, Aristotle, Longinus, and the major medieval critics. Offered: jointly with ENGL 507.

C LIT 508 History of Literary Criticism and Theory II (5, max. 15) Literary criticism and theory from the Middle Ages and the Renaissance through the eighteenth century to, but not including, Kant. Offered: jointly with ENGL 508.

teenth century to, but not including, Kant. Offered: jointly with ENGL 508.

C LIT 509 History of Literary Criticism and Theory III (5, max. 15) Literary Criticism and theory from Kant's Critique of Judgment to the mid-twentieth century and the work of Northrop Frye. Offered: jointly with ENGL 509.

C LIT 510 History of Literary Criticism and Theory IV (5, max. 15) A study of the major issues in literary criticism and theory since about 1965. Offered: jointly with ENGL 510.

C LIT 511 Literary Translation (5, max. 15) Lectures on principles of translating literary works into readable English. Students present and comment on translations made by them and write seminar papers on problems of translation in theory and practice.

C LIT 516 Colloquium in Criticism (5, max. 15) Recent trends in literary criticism, taught by representatives from various literature departments, covering critical trends such as structuralism, poststructuralism, hermeneutics, reception theory, and sociological approaches to literature.

C LIT 517 Colloquium in Folklore (5) Recent trends in folklore studies, taught by representatives from various literature departments and disciplines in the social sciences.

C LIT 518 Colloquium in Medieval Studies (5) Salient literary aspects of the European Middle Ages, taught by representatives from various literature departments as well as from related disciplines, such as philosophy, art history, history, and comparative religion.

C LIT 530 Cultural Criticism and Ideology Critique I (5, max. 15) A study of the main attempts to come to an understanding of the humanities and the nature of historical interpretation in a cultural context.

C LIT 535 Cultural Criticism and Ideology Critique II (5, max. 15) Offerings vary to cover individual theorists and particular manifestations of cultural criticism and ideology critique.

C LIT 545 Medieval Studies (3/5, max. 15)

C LIT 546 Studies in Renaissance and Baroque (3-5, max. 10) Aspects of Western European literature during the Renaissance and Baroque period. Course content varies.

C LIT 547 Studies in Eighteenth-Century Literature (3-5, max. 10) Examination of various trends in eighteenth-century literature including the Enlightenment, Rationalism, Pre-Romanticism, and Neo-Classicism. Course content varies with instructor.

C LIT 548 Studies in Nineteenth-Century Literature (3-5, max. 10) Examination of various trends in nineteenth-century literature including Romanticism, Realism, Naturalism, and Symbolism.

C LIT 549 Twentieth-Century Literature (3-5, max. 10) Selected movements, schools, and trends of significance in twentieth-century literature of Europe and Americas. Symbolism, surrealism, dada, expressionism, neorealism, existentialism, nouveau roman, and absurd may be considered. Texts in English, French, and German figure most prominently, but Spanish, Italian, Russian, and other materials may be examined. Content and emphasis vary.

C LIT 570 The Novel: Theory and Practice (3-5, max. 15) Study of the novel as a genre, examining two or more novels of varying national literatures. Course content varies.

C LIT 571 The Lyric: Theory and Practice (3-5, max. 15) Examination of central questions in the study of the lyric genre as approached from an international point of view. Course content varies.

C LIT 572 The Epic: Theory and Practice (3-5, max. 15) Examination of epic literature as exemplified by selected works chosen from various cultures and periods (e.g., French and German medieval courtly epic, the epic in Renaissance and baroque Europe, traditions of the mock epic). Course content varies.

C LIT 573 The Drama: Theory and Practice (3-5, max. 15) Examination of various aspects of the drama as a major literary genre, as approached from international and multilingual points of view. Course content varies.

C LIT 576 Seminar in East-West Literary Relations (3-5, max. 15) Comparative investigation of literary topics requiring the study of both Eastern and Western documents. Explores parallels and contradictions between the two, in concepts, ideas, and specific topics. A comparative paper on a chosen topic with qualified conclusions is required. Emphasis varies. Prerequisite: at least one East Asian language.

C LIT 596 Special Studies in Comparative Literature (3-5, max. 15) Offered occasionally by visiting or resident faculty. Course content varies.

C LIT 599 Special Seminar or Conference (1-9, max. 30) Group seminars or individual conferences scheduled to meet special needs. Prerequisite: permission of graduate program adviser.

C LIT 600 Independent Study or Research (*)

C LIT 700 Master's Thesis (*)

C LIT 800 Doctoral Dissertation (*)

Comparative Religion

See International Studies.

Computer Science

See also Computer Science and Engineering in the College of Engineering section.

114 Sieg

A Bachelor of Science degree in computer science is offered by the Department of Computer Science and Engineering, and is administered through the College of Arts and Sciences. The department also offers a Bachelor of Science in Computer Engineering degree, administered through the College of Engineering, and graduate degrees in computer science. While the department offers both computer science and computer engineering, the computer science major is more appropriate for students who want to have a double major with another College of Arts and Sciences program (for example, mathematics or economics), who want the additional flexibility of the computer science requirements (the computer engineering major has more required courses and fewer electives), or who are more interested in software systems and computation than in hardware. The computer engineering major is more appropriate for students who are interested in building systems that include both custom hardware and software components, who have strong interests in electrical engineering, or who specifically want an engineering degree. More information concerning these programs can be found under Computer Science and Engineering in the College of Engineering section of this catalog.

Computer science is the study of information and algorithms within the context of real and abstract computing devices. Computer scientists are interested in such topics as the representation and storage of information, algorithms to access, display, edit, and transfer information, programming languages to express algo-

gorithms, and hardware and software processors to execute algorithms. These concerns lead to practical developments in computer systems software, such as operating systems and compilers, in application areas, such as artificial intelligence and computer graphics, and to theoretical investigations of computers, algorithms, and data.

The objective of undergraduate education in computer science is to develop broadly educated and competent graduates for professional careers or graduate studies. Especially important is a foundation that will endure as technology advances and changes.

The computer field has a broad base of industrial and governmental jobs suitable for the Bachelor of Science graduate: systems analyst, systems programmer, technical salesperson, and hardware or software engineering specialist. In addition, there are jobs for which graduate education may be appropriate: producers and developers of computer systems, and teachers and researchers.

Undergraduate Programs

Bachelor of Science In Computer Engineering

See Computer Science and Engineering in the College of Engineering section.

Bachelor of Science

Adviser
Heidi Mair
114 Sieg
email: ugrad-cs-advisor@cs.washington.edu

Admission Requirements: 45 credits completed, including MATH 124, 125, 126; PHYS 121/131; CSE/ENGR 142 and CSE 143. A minimum 3.00 GPA for all courses at this or other universities. These conditions guarantee consideration, but not acceptance.

Major Requirements: (1) Mathematics and Science Component (39 credits): MATH 124, 125, 126 and three courses selected from MATH 307, 308, 309, STAT 311, or any approved senior elective mathematics or statistics courses (shown in the undergraduate handbook available in 114 Sieg); PHYS 121/131, 122/132, 123/133. (2) Inner Core Component (32 credits): CSE/ENGR 142, CSE 143, 321, 322, 326, 341, 370, 378. (3) Outer Core Component (minimum of four courses): 401, 403, 421, 431, 444, 451, 457, 471, and 473 (if more than 12 credits are taken, excess credits may count toward senior electives). (4) Elective Component (minimum of 7 credits): 400-level CSE courses (not including those used to satisfy the Outer Core), up to 6 credits of 498, and courses chosen from the approved senior elective course list. (5) Recommended: 10 credits of natural science, business, or engineering beyond the requirements listed in (1) through (4), above.

Graduate Program

See Computer Science and Engineering in the College of Engineering section.

For faculty listing and course descriptions see Computer Science and Engineering in the College of Engineering section.

Dance

258 Meany

The dance program is designed as part of a liberal arts curriculum and provides students with a foundation for future advanced work in performance or movement-related work. It is recommended that majors supple-

ment their dance studies with work that will provide a foundation for later specialization in dance ethnology, dance history and criticism, performance art, education, movement therapy, or movement science.

Undergraduate Program

Adviser
Susanne Recordon
258 Meany, Box 351150

Bachelor of Arts

Admission Requirement: Admission to the dance major is twice yearly: autumn for winter quarter admission, and spring for autumn quarter admission. Applicants should have completed or be currently enrolled in a dance technique course. Applications must be made by the fifth week of the quarter. Transfer students and out-of-town freshmen should consult the department for audition arrangements.

Major Requirements: Minimum 70 credits in dance to include 166, 234, 230 or 262, 266, 270 (2 credits, one crew minimum), 344, 345, 354, 366, 390, 420, 480, 493; technique (12 credits minimum at the 200 level; 6 credits minimum in both ballet and modern dance). Minimum 10 credits from the following: ART H 203, 300; DRAMA 250, 251, 252, 253; MUSIC 270, 316, 317, 318, 331, 386; PSYCH 306, 310; B STR 301.

Students must demonstrate consistent and acceptable progress in technique, performance, and academic areas toward the attainment of a degree.

Minor

Minor Requirements: Minimum 25 credits to include 10 credits from DANCE 166, 234, 344, 345, 493; and 15 credits from DANCE 201, 202, 203, 204, 205, 206, 301, 302, 303, 304, 305, 306.

Graduate Program

Hannah C. Wiley, Graduate Program Coordinator

The dance program offers graduate study leading to a Master of Fine Arts degree. This program is designed specifically for professional dance performers who are anticipating retirement and wish to prepare for a transition into college teaching careers. All graduate students will comprise the Chamber Dance Company and will hold teaching assistantships.

During the two-year program, a student must complete at least 73 credits, of which a minimum of 21 must be in an area of specialization, e.g., choreography/production, history/research/criticism, ethnology, Laban Movement Analysis, or Individually Designed Specialization (IDS). The master's project may be artistic or scholarly in nature.

Admission Requirements

(1) A letter of application and résumé; (2) an undergraduate degree; (3) a minimum of eight years of professional performing experience; (4) the ability to demonstrate movement skills at a professional level in at least one idiom; an in-person audition or performance video tape; (5) three letters of reference verifying success and responsibility in the professional dance arena. Neither a foreign language nor the Graduate Record Examination is required. Application deadline is January 15.

Financial Aid

All graduate students will receive tuition waivers and teaching assistant stipends.

Correspondence and Information

Graduate Program Coordinator
255 Meany, Box 351150

Faculty

Director

Hannah Wiley

Professors

Boris, Ruthanna 1965, (Emeritus); DTR, 1946; ballet technique and dance therapy.

Knapp, Joan S. * 1981, (Emeritus); MA, 1964, University of Illinois; dance composition, improvisation, kinesthetic training.

Russell, Francia 1988, (Affiliate); ballet.

Wiley, Hannah * 1984; MA, 1981, New York University; ballet, scientific aspects of dance, choreography, dance in higher education.

Associate Professor

Lepore, James M. * 1991; MFA, 1989, Temple University; movement studies and choreography, modern and ethnic dance.

Assistant Professors

Novak, Marsha 1990, (Affiliate); MS, 1982, University of Washington, physical therapy.

Parker, Rip 1989; MFA, 1992, University of Washington; modern, jazz, and ethnic dance; dance history; choreography.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

DANCE 101, 102, 103 Introduction to Dance (5, max. 10; 5, max. 10; 5, max. 10) **VLPA** Introduction to dance as an art form. Lectures in dance appreciation. Studio experience in ballet and modern dance techniques. Attendance required at outside events. Prerequisite: 101 for 102; 102 for 103.

DANCE 104, 105, 106 Modern Technique (* max. 8; * max. 8; * max. 8) **VLPA** Advanced beginning. Continued development of all beginning areas and expansion of movement vocabulary. Prerequisites: 103 or permission of instructor for 104; 104 or permission of instructor for 105; 105 or permission of instructor for 106.

DANCE 107, 108, 109 Ballet Technique I (* max. 8, * max. 8, * max. 8) **VLPA** Advanced beginning. Continued development of all beginning areas. Expansion of ballet vocabulary. Prerequisites: 103 or permission of instructor for 107; 107 or permission of instructor for 108; 108 or permission of instructor for 109.

DANCE 110, 111, 112 Jazz Technique I (2, max. 4; 2, max. 4; 2, max. 4) **VLPA** Introduction to jazz technique. Dance performance attendance required. Prerequisites: 110 or permission of instructor for 111; 111 or permission of instructor for 112.

DANCE 166 Dance Composition I (5) **VLPA** Introduction to the principles of dance composition through improvisation. Prerequisite: permission of instructor. Offered: alternate years.

DANCE 201, 202, 203 Ballet Technique II (* max. 8, * max. 8, * max. 8) **VLPA** Intermediate. Expansion of ballet vocabulary. Prerequisites: 109 or permission of instructor for 201; 201 or permission of instructor for 202; 202 or permission of instructor for 203.

DANCE 204, 205, 206 Modern Dance Technique II (* max. 8, * max. 8, * max. 8) **VLPA** Intermediate. Expansion of movement vocabulary. Prerequisites: 109 or permission of instructor for 204; 204 or permis-

sion of instructor for 205; 205 or permission of instructor for 206.

DANCE 210, 211, 212 Jazz Technique II (2, max. 4; 2, max. 4; 2, max. 4) VLPA Intermediate-level jazz technique. Continued development of beginning areas. Expansion of movement vocabulary. Dance performance attendance required. Prerequisite: 112 or permission of instructor for 210; 210 or permission of instructor for 211; 211 or permission of instructor for 212.

DANCE 230 Kinesthetic Training (3) VLPA Skinner Knowledge gained through direct perceptual experience. Uses imagery to facilitate efficient functioning of the mind/body complex in an artistic task. Offered: alternate years.

DANCE 234 Selected Idioms as Ethnic Dance (5) VLPA/I&S Survey course presenting selected dance idioms as they relate to ethnicity in their performance, aesthetics, and history. May have studio component. Offered: alternate years; W.

DANCE 262 Contact Improvisation (3) VLPA Lepore Interactive dancing based on weight sharing. Emphasis on proprioceptive and tactile sensibilities as they relate to movement improvisation. Techniques for supporting weight studied and practiced. Prerequisite: one year of dance technique. Offered: alternate years.

DANCE 266 Dance Composition II (5) VLPA Dance composition in relation to music. Emphasis on solos and small groups. Prerequisites: 166. Offered: alternate years.

DANCE 270 Dance Performance Activities (1-3, max. 9) VLPA Performance in a dance or work on a crew for a dance production, either a studio showing or public performance, conducted under faculty supervision. Prerequisite: permission of instructor. Credit/no credit only.

DANCE 301, 302, 303 Ballet Technique III (* max. 8; * max. 8; * max. 8) VLPA Advanced-intermediate level: continued development and expansion in all areas of technique. Prerequisites: permission of instructor for 301; 301 or permission of instructor for 302; 302 or permission of instructor for 303.

DANCE 304, 305, 306 Modern Dance Technique III (1-8, 1-8, 1-8) VLPA Intermediate-advanced. Dance sequences of greater complexity. Prerequisites: permission of instructor for 304; 304 or permission of instructor for 305; 305 or permission of instructor for 306.

DANCE 310, 311, 312 Jazz Technique III (2, max. 4; 2, max. 4; 2, max. 4) VLPA Advanced-level jazz technique. Investigation of jazz styles such as Afro-Caribbean, Luigi, and musical theatre. Dance performance attendance required. Prerequisites: 212 or permission of instructor for 310; 310 or permission of instructor for 311; 311 or permission of instructor for 312.

DANCE 324 Partnering Techniques (1, max. 6) VLPA Study and practice in supported dance work.

DANCE 344 Early Dance History (5) VLPA/I&S Development of Western theatrical dance through the nineteenth century. Offered: alternate years.

DANCE 345 Late History of Dance (5) VLPA/I&S Twentieth-century Western theatrical dance. Offered: alternate years; Sp.

DANCE 354 Laban Movement Analysis (5) VLPA Lepore Introduction to the movement theories of Rudolf Laban and his protégés. Coursework includes Effort/Shape, Space Harmony, symbology, and an introduction to Labanotation. Prerequisite: one year movement or dance technique training. Offered: alternate years; A.

DANCE 366 Dance Composition III (5) VLPA Lepore, Wellborn Dance composition in relation to

production. Emphasis on larger group works. Prerequisite: 266 and dance major or permission of instructor. Offered: alternate years; Sp.

DANCE 385 Pointe Techniques (1, max. 6) VLPA Pointe technique for intermediate and advanced dancers.

DANCE 390 Dance Teaching Methodologies (5) VLPA Wiley Introduction to dance pedagogy, including educational theory, motor learning, and biomechanical principles, and to music as it relates to the teaching of dance. Prerequisite: dance major or permission of instructor. Offered: alternate years.

DANCE 420 Dance Aesthetics (3) VLPA/I&S Skinner Philosophical investigation of the expressive elements of dance. Reading and discussion of the concepts of beauty, style, and aesthetic theory.

DANCE 466 Advanced Dance Composition (3) VLPA Explores a variety of approaches to personal creative process in dance composition. Prerequisites: 365, 366, and 367 or permission of instructor.

DANCE 480 Senior Seminar (5) VLPA Lepore, Wiley Culminating project emphasizing a synthesis of experiences in the Dance Program with a focus on individual interests. Prerequisite: senior dance major.

DANCE 490 Special Studies in Dance (1-3, max. 10) VLPA Special studies designed to address contemporary and historical concerns in the field of dance. Prerequisite: permission of instructor.

DANCE 493 Anatomy for Dance (5) VLPA/NW Lepore, Wiley Anatomy of the musculoskeletal system and its applications in dance movement. Exploration of movement principles based on Bartenieff Fundamentals. Prerequisite: dance major or permission of instructor. Offered: alternate years.

DANCE 499 Undergraduate Independent Study (* max. 9)

Courses for Graduates Only

DANCE 510 Chamber Dance Production (3, max. 9) Dance production in the university environment. Publicity, programming, budgeting. Rehearsal, rehearsal direction, and performance of Chamber Dance Company repertoire. Credit/no credit only.

DANCE 515 Dance Research Methods (3) Seminar in problem identification and definition, theory development, research design, data analysis, and interpretation. Examples of various types of dance research.

DANCE 520 Dance in Higher Education (3) Readings, discussion, and observation of teaching methods. Students assist faculty in the instruction of lower-level classes. Selected anatomical, historical, and aesthetic concepts as they relate to dance pedagogy. Development of a personal teaching style appropriate for university-level dance courses.

DANCE 521 Dance Administration (3) Readings and discussion relating to dance administration in college and professional settings. Topics include: curricular development, academic advising, budgetary procedures, personnel issues, and problems related to dance as a performing art within the university structure.

DANCE 522 Applications of Dance Education (3) Readings, lecture, and discussion relating to the role of dance in the community, the university, and other social contexts. Guest lecturers in dance professions and related arts address the topic of interdisciplinary potentials and responsibilities.

DANCE 544 Early Dance History (3) Study of the evolution of dance from ritual to a theatre art form. Offered: alternate years.

DANCE 545 Late Dance History (3) Roots of contemporary dance as an art form and its relationship to

developments in ballet since the turn of the century. Offered: alternate years.

DANCE 590 Dance Teaching Methodologies (3) Wiley Introduction to dance pedagogy with an emphasis on motor learning skills and biomechanics. Practical teaching experience. Offered: alternate years.

DANCE 595 Master's Project (3) Culminating project in area of interest developed in consultation with faculty advisor and supported by elective courses. Full faculty approval of proposed project by end of first year. Formal presentation, appropriate to project's content, presented to full faculty during second year. Projects may range from creative to scholarly.

DANCE 600 Independent Study or Research (* max. 9)

Drama

101 Hutchinson

The School of Drama is concerned with the whole continuum of acting, directing, designing, theatre history/theory, and dramatic forms through which the human dramatic imagination finds expression.

The School uses four theatres including the Playhouse, with a thrust stage; and the Penthouse Theatre, the first theatre-in-the-round built in America. Faculty- and student-directed plays drawn from the full range of world dramatic literature are presented throughout the year. Additional productions are mounted in the two theatres of Meany Hall. Technical and design support is provided for opera productions of the School of Music and for programs of the dance division.

Undergraduate Program

Adviser
129 Hutchinson

Bachelor of Arts

Major Requirements: A minimum of 61 credits in drama courses. Three quarters of acting: 251, 252, 253 or 351, 352, 353 (with 350 series, 3 credits of 298 or 498 also required). Three quarters of technical theatre: 210, 211, 212, 290, 291, 292. 25 credits in theatre history, dramatic literature, and criticism: 302, 371; one of 372, 373, 374, 377, 378, 472; one of 473, 475, 476; one of 416, 494 (or substitution of additional course from two previously listed series). Electives at the 300-400 level to complete the balance. Majors are required to register for 401 each quarter they are in residence.

Minor

Minor Requirements: 34 credits consisting of DRAMA 101, 210, 211, 212, 251, 252, 253, 371. (DRAMA 290, 291, and 292 recommended.)

Graduate Program

The School of Drama offers programs of graduate study leading to the Master of Fine Arts and Doctor of Philosophy degrees. Areas of study for the M.F.A. degree are acting, stage direction, scene design, lighting design, and costume design. Most students should expect to spend three years to complete requirements for the M.F.A. degree.

The Ph.D. program provides students with training for scholarly research in theatre history, dramatic literature, theory, and criticism. Students are also encouraged to do interdisciplinary work with such allied programs as the Ph.D. program in critical theory.

Admission Requirements

Students may enter only in autumn quarter. Since admission requirements vary for each of the graduate programs, applicants should contact the School for current application information and deadlines.

Faculty

Director

Sarah N. Gates

Professors

Clay, Jack D. * 1986, (Emeritus); MA, 1956, Northwestern University; acting.

Comtois, Mary Elizabeth * 1985, (Emeritus); PhD, 1970, University of Colorado (Boulder); playwriting.

Crider, James R. * 1952, (Emeritus); MA, 1950, University of Washington; costume design.

Dahlstrom, Robert A. * 1971; MA, 1967, University of Illinois; scene design.

Haaga, Agnes M. 1947, (Emeritus); MA, 1952, Northwestern University; child drama.

Hostetler, Paul S. * 1974, (Emeritus); PhD, 1965, Louisiana State University; theatre history, directing.

Loper, Robert B. * 1967, (Emeritus); PhD, 1957, University of Birmingham (UK); acting, directing.

Siks, Geraldine B. 1949, (Emeritus); MA, 1940, Northwestern University; child drama.

Sydow, John D. 1970, (Emeritus); MFA, 1950, Yale University; directing.

Witham, Barry B. * 1979; PhD, 1968, Ohio State University; theatre history.

Associate Professors

Forrester, William D. * 1972; MFA, 1969, Yale University; scene design.

Gates, Sarah N. * 1983; MA, 1974, University of California (Santa Barbara); MFA, 1983, Boston University; costume design.

Hunt, Robyn * 1988; MFA, 1978, University of California (San Diego); actor training, cross cultural performances, techniques, and script writing.

Lorenzen, Richard L. * 1970; PhD, 1968, Ohio State University; theatre history.

Lounsbury, Warren C. 1948, (Emeritus); MA, 1953, University of Washington; technical direction.

Valentinetti, Aurora 1943, (Emeritus); MA, 1949, University of Washington; puppetry.

Assistant Professors

Bryant-Bertail, Sarah * 1990; PhD, 1986, University of Minnesota; dramatic criticism, semiotics, feminist theatre.

Geiger, Mary L. * 1993; MFA, 1985, Yale University; lighting design.

Schneider, Sara K. * 1995; MA, 1988, PhD, 1992, New York University; interdisciplinary arts, American culture, performance.

Wolcott, John R. * 1967; PhD, 1967, Ohio State University; theatre history, computing in theatre research.

Senior Lecturer

Walker, Milton B. * 1988; MA, 1970, University of Washington; new American plays and the classical repertoire, directing.

Lecturers

Burke, Thomas D. 1994; MFA, 1988, University of Washington; CAD, technical theatre.

Shahn, Judith * 1990; BFA, 1977, Carnegie-Mellon University; voice production for the theatre, dialects, Shakespeare and modern text.

Trout, Deborah L. 1994; MFA, 1994, Yale University; costume design.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

DRAMA 101 Introduction to the Theatre (5) VLPA *Schneider* The theatre as an art form with emphasis on the play in production. The role of the various theatre artists: actors, directors, designers, and playwrights. Required attendance at one or more performances. Lecture and discussion groups. For nonmajors. Offered: AWSp.

DRAMA 102 Text and Performance (5) VLPA Play analysis for the theatre. Dramatic text as scenario for production. A consideration of how theatre practitioners use text as a source of inspiration for acting, directing, and design. The relationship between dramatic forms and theatrical production illustrated through film and study of historic productions.

DRAMA 201 Dramatic Action (5) VLPA Play structure through analysis of one-act plays in all genres, with special attention to plotting and the various means used to achieve a unity of action as the basis of all drama.

DRAMA 210, 211, 212 Theatre Technical Practice (4, 4, 4) VLPA *Burke, Geiger, Trout* Intensive lecture-laboratory in basic theories, techniques, and equipment of the stage. 210: technical procedures; 211: costumes; 212: stage lighting.

DRAMA 250 Acting Skills for Everyday Life (4) VLPA Introduction to acting techniques as tools for nonactors. Effective communication, relaxation, and stress reduction. Role playing, goal identification and achievement in public speaking, marketing presentations, courtroom persuasion, teaching situations. Skill development through theatre games, role playing, improvisation.

DRAMA 251, 252, 253 Acting (4, 4, 4) VLPA Theory and practice of fundamentals of American method, based on principles of Stanislavsky and their American evolution. 251: development of basic acting skills through monologue work. 252: direct application of methodology through scene work. 253: preparation of audition material and scene work within the context of entire play. Prerequisites: 251 for 252; 252 for 253. Offered: A, W, Sp.

DRAMA 259 Performance Practicum (2-6, max. 12) VLPA Special work in various aspects of performance technique.

DRAMA 280, 291, 292 Theatre Technical Practices Laboratory (1-3, 1-3, 1-3) VLPA Laboratory course involving specific production assignment, either in-shop or in-theatre or both. Prerequisites: 210 for 290 or concurrent registration; 211 for 291 or concurrent registration; 212 for 292 or concurrent registration.

DRAMA 298 Theatre Production (1-2, max. 9) VLPA Laboratory course for students participating in School of Drama minor productions and projects. Credit/no credit only. Prerequisite: being cast in a production or receiving a crew assignment. Offered: AWSp.

DRAMA 302 Play Analysis (5) VLPA *Bryant-Bertail, Schneider* Analyses of plays, based on leading critical traditions. Illustrates variety of approaches to a play, criteria for choosing best approach for a given play, and ways in which criticism aids in understanding dramatic effect, for both reader and practitioner.

ner. Prerequisite: some theatre background. Offered: ASp.

DRAMA 305 Computers in the Theatre (5) VLPA *Wolcott* Computing and information systems as problem solving tools for the theatre. Analysis of problems in theatre production and scholarship, with approaches to solutions through computing. Database, spreadsheet and CAD system applications in the practice and study of lighting and scenic design, theatre management, and research in theatre history and criticism. Offered: A.

DRAMA 312 Lighting Technology (3) VLPA *Geiger* Student functions as master electrician for one production during the quarter.

DRAMA 313 Scenery Construction (3) VLPA *Burke* Survey of materials, processes, and equipment in the fabrication, assembly, painting, rigging, and installation of stage scenery and properties. Prerequisite: 210 or permission of instructor.

DRAMA 314 Introduction to Design for the Performing Arts (3) VLPA Survey of the role of design (scenery, costume, lighting, and sound) in the contemporary performing arts. Consideration of communicative mission and limitations of each of the design areas. Prerequisites: 210, 211, 212.

DRAMA 316 Theatrical Makeup (2) VLPA Basic principles, with intensive practice in application of makeup for use on proscenium and arena stages. Open to nonmajors.

DRAMA 351, 352, 353 Advanced Acting (4, 4, 4) VLPA *Hunt* Centers on a strong physical approach, developing practical skills for expressing thoughts, playing action, and exploring character conviction in powerful ways. Addresses the challenge of integrating mental homework (script analysis, physiological motivation) with clarity of physical expression. Prerequisites: audition for 351; 351 for 352; 352 for 353. Offered: A, W, Sp.

DRAMA 371 Theatre and Society (5) VLPA/IAS Introduction to the history of the theatre from the Greeks to the present day. Development of the theatre as a social institution. Reading of major texts from each period. Offered: A.

DRAMA 372 Actors, Scenes, and Machines (5) VLPA Examines past and present productions of plays, musicals, operas, and related performances to understand the relationship between the performer, the playhouse, and scenic spectacle. Readings include selected plays and theoretical works. Prerequisite: 302 and 371.

DRAMA 373 Women in Theatre (5) VLPA *Bryant-Bertail* Examines both the inclusion and exclusion of women by the cultural practice of theatre. Has two primary aims: to provide an historical overview of women in playwriting, acting, directing and criticism, and to apply contemporary social issues to the practice, texts, and criticism of the stage. Prerequisite: 302 and 371.

DRAMA 374 History of the Greek Theatre and Its Drama (5) VLPA *Wolcott* Examination of the relationship of the physical theatre and the productions that took place within that theatre, with particular emphasis on the text performed, styles of acting, scenic elements, and the critical theories that influenced the theatre of the period. Prerequisite: 302 and 371.

DRAMA 377 History of the European Renaissance Theatre and Its Drama (5) VLPA *Wolcott* See 374 for course description. Prerequisite: 302 and 371.

DRAMA 378 History of the English Theatre and Its Drama: 1500-1700 (5) VLPA See 374 for course description. Prerequisite: 302 and 371.

DRAMA 391 Beginning Technical Practices (1-3, max. 9) VLPA Laboratory course involving specific production assignments, either in-shop or in-theatre, or

both. Prerequisites: 290, 291, 292 or receiving a production assignment.

DRAMA 395 Creative Classroom Computing (5)
VLPA Wolcott Innovative uses of computers in the classroom. Survey of learning styles and teaching strategies, and ways to use the computer as a non-traditional teaching tool. Students develop short course software demonstrations responsive to instructional needs in their individual disciplines. Teaching and computing experience helpful, but not required.

DRAMA 401- Drama Colloquium (0-0-1, max. 3)
VLPA Weekly lectures by guest artists, presentations by faculty or students of works in progress. Required of all undergraduate and graduate drama majors each quarter in residence. Offered: AWSp.

DRAMA 410 Advanced Theatre Technical Practices (2-4, max. 20) **VLPA** Production-related apprenticeship, in the areas of scene construction, scene painting, costume, or lighting. Prerequisites: 210, 211, 212, 418, or permission of instructor. Offered: AWSp.

DRAMA 413 Advanced Scene Construction (3)
VLPA Special problems in scene construction materials and rigging. Prerequisites: 210, 212, 290, 292, 410 or equivalent practical experience, and 420.

DRAMA 414 Scene Design (3, max. 6)
VLPA Dahlstrom, Forrester Theory, practice, and rendering of scene designs. Repeat of course involves intermediate designs and models. Prerequisites: 210, ART H 203, or equivalent.

DRAMA 415 Stage Costume Design (3, max. 6)
VLPA Gates Theory, practice, and rendering of costume designs for the theatre. Repeat of course involves intermediate designs. Prerequisites: 211, ART 109 and ART H 203 or equivalent or permission of instructor; 416 for repeat of course.

DRAMA 416 History of Western Dress (5) VLPA
Gates Survey history of Western dress. Emphasis on use of this information by theatrical costume designers. Includes development of costume for drama, ballet, and opera. Recommended: 371, 372, or background in history, or permission of instructor.

DRAMA 417 Stage Costume Patternmaking and Construction (3, max. 6) VLPA Techniques of costume construction, including study of fabrics; emphasis on creating patterns by draping. Prerequisites: 211, 416, or permission of instructor.

DRAMA 418 Scene Painting (3, max. 6) VLPA
Forrester Lecture-laboratory with focus on techniques and principles of scene painting. Uses of various media and types of equipment as applicable to varied scenic pieces. Prerequisite: 210 or permission of instructor.

DRAMA 419 Advanced Stage Lighting Design (3, max. 9) VLPA **Geiger** Development of a working process consistent with current professional practice. Includes drafting, worksheets, study of color. Students read plays and develop analytical skills. Prerequisite: senior standing and permission of instructor.

DRAMA 420 Design and Technical Drafting (2, max. 4) VLPA Laboratory and project critique covering stage design graphics and technical drawing; specifically: designer's elevations, ground plans, sections, detail drawing, transposition of design drawing information to technical drawings. Prerequisite: 210.

DRAMA 421 Drawing and Rendering Techniques for the Theatre (2, max. 4) VLPA **Forrester, Gates** Weekly figure-drawing laboratories with live model and weekly field trips for laboratories in drawing natural phenomena and architectural detail. Studies in historical drawing styles. Practice in use of several media and techniques of expression. Prerequisites: 210, 211.

DRAMA 441 Beginning Playwriting (5, max. 10)
VLPA Writing exercises and drafts of a one-act play

provide first experience in writing for performance. Readings of representative one-act plays introduce genres and writing styles. Prerequisites: 253 or 353; 210, 211, 212; or practical theatre experience.

DRAMA 450 Rehearsal Laboratory (2, max. 6)
VLPA Acting in projects directed by graduate directing students. Prerequisite: one year of acting and audition.

DRAMA 454 Projects in Acting (3, max. 9) VLPA Rehearsal and classroom performance of dramatic literature of various periods and styles. Prerequisite: audition.

DRAMA 460 Introduction to Directing (3) VLPA
Walker Student is introduced to the art of the stage director. Prerequisites: 302; 253 or 353; 210, 211, 212; and permission of instructor. Offered: A.

DRAMA 461, 462 Elementary Directing (3, 3)
VLPA Walker Elementary study of the art of the stage director. Prerequisites: 460 and permission of instructor for 461; 461 and permission of instructor for 462.

DRAMA 466 Stage Management (2-5, max. 15)
VLPA Study and practice of stage management. Prerequisites: 210, 211, 212, 290, 291, 292, or permission of instructor.

DRAMA 472 History of the English Theatre and Its Drama: 1700-1900 (5) VLPA **Witham** Examination of the relationship of the physical theatre and the productions that took place within that theatre. Particular emphasis on the text performed, styles of acting, scenic elements, and the critical theories that influenced the theatre of the period. Prerequisite: 302 and 371.

DRAMA 473 Modern European Theatre and Drama (5) VLPA **Witham** See 472 for course description. Prerequisite: 302 and 371.

DRAMA 475 Modern English Theatre and Drama (5) VLPA **Witham** Major trends in contemporary English theatre, post-World War II to the present. Performers, dramatists, and designers who shaped the course of the theatre following the "angry young rebellion" of the 1950s. Prerequisite: 302 and 371.

DRAMA 476 Modern American Theatre and Drama (5) VLPA **Witham** Major forces shaping modern American theatre, Eugene O'Neill to the present. Leading dramatists, directors, and designers of the post-World War II era. Experiments such as the federal theatre project, group theatre, and living theatre. Prerequisite: 302 and 371.

DRAMA 490 Special Studies in Acting-Directing (1-6) VLPA Prerequisite: permission of instructor.

DRAMA 491 Special Studies in Design-Technical (1-6) VLPA Prerequisite: permission of instructor.

DRAMA 494 Special Studies in Theatre and Drama (5, max. 20) VLPA **Bryant-Bertail, Schneider, Witham, Wolcott** Topics in drama, history, and criticism. See Time Schedule for specific topic. Prerequisites: 302, 473, 476, or permission of instructor.

DRAMA 495 Practicum in Design and Technical Theatre (2-6, max. 15) VLPA Emphasis on developing design and technology problem-solving skills through laboratory and project evaluation. Prerequisites: 210, 211, 212, 313, or permission of instructor.

DRAMA 496 Stage Costume Problems (2, max. 8)
VLPA Specific research problems of stage costume design and execution: accessories, masks, wigs, fabric modification, millinery or construction analysis for specialized costumes. Topics vary. Prerequisites: 211, 416, and permission of instructor.

DRAMA 497 Theatre Organization and Management (3) VLPA Theoretical and practical examination of the professional theatre organization and management: legal structures, funding, business practice,

unions, and operational procedures. Open to nonmajors.

DRAMA 498 Theatre Production (1-2, max. 9)
VLPA Laboratory course for students participating in School of Drama major productions. Credit/no credit only. Prerequisite: being cast in a production or receiving a crew assignment. Offered: AWSp.

DRAMA 499 Undergraduate Research (1-5, max. 15) Prerequisite: permission of instructor.

Courses for Graduates Only

DRAMA 502 Designer-Director Analysis (4)
Dahlstrom, Walker Methods of examining plays to make the collaboration of director and designer productive. Attempts to create a structural whole from visual and verbal approaches to analysis. Prerequisite: graduate standing in drama.

DRAMA 510 Design Studio (3, max. 18)
Dahlstrom, Forrester, Gates, Geiger Investigation of space, form, light, texture, and color in total theatre design, stressing mastery of the media, methods of presentation and execution, and intelligent and appropriate visual reaction to a dramatic text. Prerequisites: graduate standing in drama.

DRAMA 512 Lighting Design Seminar (1/4, max. 18)
Geiger Forum for graduate lighting students to further explore the art of lighting design. Assignments include paper projects, School of Drama production, and field trips to local theatres. Prerequisites: graduate standing.

DRAMA 513 Technical Direction (3, max. 9) Practical experience in mounting scenery for a current production; study of materials, techniques, management, and equipment of technical theatre; theatre planning and programming. Prerequisites: 413 and permission of instructor.

DRAMA 514 Design and Technical Theatre Colloquium (2, max. 18) Discussion of work in progress or completed in production, centering on the conceptual work of the designer/director on the production and the methods of execution in the shops and on stage. Offered: AWSp.

DRAMA 515 Structures Analysis for the Theatre (3) Principles of engineering statics as applied to scenery construction problems.

DRAMA 516 Stage Rigging (3) Theory and practice of hemp, counterweight, and motorized rigging systems for the stage.

DRAMA 518, 519 Studies in Historic Design (3, 3)
Dahlstrom, Forrester, Gates Investigation of artistic principles and modes that influenced the art, architecture, furniture, and decor of selected historic periods. Prerequisite: 518 for 519, or permission of instructor.

DRAMA 520 Advanced Theatre Practicum (1-5, max. 15) Professional student internship with professional theatres: scenery, lighting, scene painting, costume, acting, directing, stage management, theatre management. Prerequisite: permission of instructor.

DRAMA 551, 552, 553 Teaching of Acting (3, 3, 3) Seminar discussion on problems in teaching acting to undergraduate students in 251, 252, and 253. Prerequisites: permission of instructor and being a teaching assistant in acting.

DRAMA 555 Studies in Acting (2-6, max. 18) Individual or group work on special skills for the actor. Topics vary. Prerequisite: admission to the Professional Actor Training Program. Offered: AWSp.

DRAMA 557 Studio I (12, max. 36) **Pearson, Shahn** Skill development in acting, voice, speech, and movement necessary for professional training in acting. Prerequisite: admission to the Professional Actor Training Program. Offered: AWSp.

DRAMA 558 Studio II (12, max. 36) *Pearson, Shahn* Continuation of 457. Prerequisites: 457 and completion of the first year of the Professional Actor Training program. Offered: AWSp.

DRAMA 559 Studio III (6, max. 18) *Pearson, Shahn* Specialized and individualized work relating to the main curriculum of the third year of the Professional Actor Training Program. Prerequisites: 458 and completion of the second year of the Professional Actor Training Program. Offered: AWSp.

DRAMA 560 Directing Apprenticeship (4, max. 12) Student works in close association with faculty and visiting directors for the entire rehearsal period in major productions of the School of Drama. Prerequisites: admission to the graduate directing program and permission of the instructor. Credit/no credit only.

DRAMA 561 Directing Projects (3-5, max. 24) *Walker* Directing practicum. One-act plays, scenes, or acts from full-length plays. Contemporary, experimental American and European drama. Prerequisite: graduate standing in the directing program.

DRAMA 562 Directing Workshops (1-3, max. 12) Workshops in specialized areas of use to the advanced director, including, but not limited to, stage combat, improvisation, physical comedy, and mask work.

DRAMA 563 Seminar in Directing (2, max. 18) *Walker* Seminar discussion of current productions; focused readings and discussion in specific areas of dramatic literature and problems related to stage direction. Prerequisites: graduate standing in drama and permission of instructor.

DRAMA 564 Advanced Rehearsal Laboratory (4, max. 8) *Walker* Rehearsal techniques that can be used in defining style in a variety of contemporary and historical plays. Prerequisite: completion of first year of graduate directing program.

DRAMA 565 Advanced Directing Projects (4-5, max. 10) Projects, including the development of theatrical events from non-dramatic texts, for third-year students in MFA directing program.

DRAMA 566 Special Studies in Directing (2, max. 12) Focus readings and text analysis of plays from specific areas of dramatic literature and problems related to their staging.

DRAMA 571, 572, 573 Problems in Theatre History Research (5, 5, 5) *Witham, Wolcott* Methods and techniques of research, interpretation, and writing in theatre history. Relationship of theatre arts to culture in diverse periods and places.

DRAMA 575, 576, 577 Seminar in Theatre History (5, 5, 5) *Witham, Wolcott* Specific topics in theatre history, examining the drama of various national, linguistic, and/or religious culture in detail.

DRAMA 581, 582, 583 Analysis of Dramatic Texts (5, 5, 5) *Bryant-Bertail, Schneider* Analytic approaches to dramatic materials, concentrating on semiotics, Marxism, feminism, or a related critical theory.

DRAMA 585, 586, 587 Seminar in Dramatic Theory (5, 5, 5) *Bryant-Bertail, Schneider* Major problems in dramatic theory, such as aesthetics, mimesis, and the nature of theatre.

DRAMA 599 Advanced Studies in Theatre Arts (1-5, max. 10) Independent projects or group study of specialized aspects of theatre arts. Prerequisite: permission of instructor.

DRAMA 600 Independent Study or Research (*)

DRAMA 700 Master's Thesis (*)

DRAMA 800 Doctoral Dissertation (*)

Economics

302 Savery

The Department of Economics is concerned with the analysis of the ways in which societies organize the production of goods and services and the distribution of these among groups and individuals. Applied fields of study available to the student include: money and banking, industrial organization, natural resource economics, labor economics, public finance, economic history, comparative systems and development, international trade, and econometrics.

Undergraduate Program

Director of Undergraduate Studies
Michelle Turnovsky
229 Savery

Advisers
304 Savery

Bachelor of Arts

Admission Requirements: (1) A minimum of 45 transferable credits, including ECON 200, 201, 311 (or STAT 311), MATH 124 (or MATH 112), and one 5 credit course in English composition; (2) a cumulative GPA for all prior college work of at least 2.80; (3) GPA for the five courses required for entrance must be at least 2.80 with a minimum of 2.0 for each course (students who have repeated any of these five courses starting winter quarter 1983 must include both grades in the average); (4) transfer students must be enrolled at the UW before they may apply.

Major Requirements: (1) Admission to the major; (2) a minimum of 50 credits in economics, including ECON 200, 201, 300, 301, 311 (or STAT 311), and at least five other upper-division courses in economics, at the 400 level, excluding ECON 496, 497, and 499; (3) grades of 2.0 or better in ECON 300 and 301; (4) one calculus course (MATH 124, 134, 112, or equivalent); (5) transfer students are required to complete a minimum of 25 upper-division economics credits in residence at the UW.

Bachelor of Science

The program is under review (1996). Consult department adviser about requirements.

The department offers two certificates for students interested in specializing in *International Economics* or in *Economic Theory and Quantitative Methods*. Students who wish to pursue these certificates should consult with an economics adviser. The department also offers an honors curriculum for students participating in the University Honors Program and for students invited by the department to pursue departmental honors.

Graduate Program

Philip Brock, Graduate Adviser

The department offers programs of study leading to the Master of Arts and the Doctor of Philosophy degrees. The academic programs in economics are designed to develop trained economists for careers in teaching, private industry, government, and international agencies. Frequent seminars—led by U.S. and foreign visitors as well as by faculty and students—are conducted as an integral element of the department's graduate program.

Special Requirements

An undergraduate major in economics is not required for admission to the graduate program, but students should have taken intermediate-level courses in

microeconomics and macroeconomics. Applicants should also have taken at least one year of calculus, one term of linear algebra, and one term of statistics. Applicants are required to take the Graduate Record Examination General Test and are encouraged to take the Subject Test in Economics.

Graduate requirements for the M.A. degree include ECON 500, 501, 502, 503, 508, 580, 581, and 582. In addition to this core program, M.A. students must take at least seven elective courses in economics at the graduate level. At least two of these courses must be in the same area (the field of specialization), and at least three of the courses must be in applied areas. M.A. students also must complete 6 credits of a supervised internship. Well-prepared students should be able to complete the M.A. program in two years.

Graduate requirements for the Ph.D. degree include ECON 500, 501, 502, 503, 508, 509, 580, 581, and 582. Ph.D. students are required to pass core examinations in microeconomics and macroeconomics. In addition to this core program, Ph.D. students must take eight other courses in economics at the graduate level. Each Ph.D. student must satisfy the requirements for two fields of specialization. The fields of specialization include advanced macroeconomic theory, advanced microeconomic theory, comparative systems and development, econometrics, health economics, industrial organization, international trade, labor economics, natural resource economics, and public finance.

Doctoral students must complete a doctoral dissertation. A foreign language is not required. A student with the recommended background can complete the doctoral program in four years, but most students take about five years.

Financial Aid

A number of teaching assistantships are awarded each year to incoming and continuing graduate students.

Research Facilities

The Institute for Economic Research provides support for graduate student and faculty research. The Center for Social Science Computation and Research maintains an extensive set of computer programs specifically designed for economic research.

Correspondence and Information

Graduate Program Coordinator
304 Savery, Box 353330
email: econadv@u.washington.edu

Faculty

Chair

Richard Startz

Professors

Barzel, Yoram * 1961; MA, 1956, Hebrew University (Israel); PhD, 1961, University of Chicago; price theory, political economy.

Brown, Gardner * 1965; PhD, 1964, University of California (Berkeley); resource and environmental economics.

Bruce, Neil * 1990; PhD, 1975, University of Chicago; public finance (economics of the public sector) especially taxation.

Cartwright, Philip W. * 1947, (Emeritus); PhD, 1950, Stanford University; macroeconomics, state and local fiscal policy.

Crutchfield, James A. * 1960, (Emeritus); PhD, 1954, University of California (Berkeley); natural resources economics, policy and management, especially marine and environmental resources.

Engel, Charles M. * 1991; PhD, 1983, University of California (Berkeley); international monetary economics.

Gillingham, J. Benton 1947, (Emeritus); MA, 1941, University of Wisconsin; economics.

Halvorsen, Robert F. * 1972; PhD, 1973, Harvard University; natural resources, public finance.

Hartman, Richard C. * 1971; PhD, 1971, University of California (Berkeley); economic theory.

Lardy, Nicholas R. * 1983, (Adjunct); PhD, 1975, University of Michigan; international economics and Chinese economic development and trade.

Lundberg, Shelly J. * 1984; PhD, 1981, Northwestern University; labor economics.

Madden, Carolyn Watts * 1984, (Adjunct); MA, 1974, PhD, 1976, Johns Hopkins University; health economics and policy.

Mah, Feng-Hwa * 1961, (Emeritus); PhD, 1959, University of Michigan; Chinese economy and foreign trade.

McCaffree, Kenneth M. * 1949, (Emeritus); PhD, 1950, University of Chicago; labor economics and the economics of medicine.

McGee, John S. * 1966, (Emeritus); PhD, 1952, Vanderbilt University; industrial organization.

Morris, Morris D. 1949, (Emeritus); PhD, 1954, University of California (Berkeley); economic history and the economy of India.

Nelson, Charles R. * 1975; PhD, 1969, University of Wisconsin; time series analysis, economic statistical analysis, advanced macroeconomic theory.

North, Douglas C. 1950, (Emeritus); PhD, 1952, University of California (Berkeley); economic history.

Parks, Richard * 1970; PhD, 1966, University of California (Berkeley); microeconomics, econometrics, finance.

Plotnick, Robert D. * 1984, (Adjunct); MA, 1973, PhD, 1976, University of California (Berkeley); economics of poverty, labor and social welfare policy.

Silberberg, Eugene * 1967; PhD, 1964, Purdue University; price theory.

Startz, Richard * 1984; PhD, 1978, Massachusetts Institute of Technology; macroeconomics, econometrics, finance.

Thornton, Judith Ann * 1961; PhD, 1966, Radcliffe; comparative systems, Soviet economics.

Turnovsky, Stephen J. * 1987; PhD, 1968, Harvard University; macro and monetary economics; international economics; theory of economic stabilization.

Worcester, Dean A. * 1969, (Emeritus); PhD, 1943, University of Minnesota; comparative systems, policy related to income distribution.

Yamamura, Kozo * 1972, (Adjunct); PhD, 1964, Northwestern University; economic development and economic history of Japan, comparative economic history.

Associate Professors

Brock, Philip L. * 1991; PhD, 1982, Stanford University; economic liberalization with emphasis on financial markets and capital accumulation.

Deolalikar, Anil B. * 1989; PhD, 1981, Stanford University; economic development, economics of human capital, economics of population, technology transfer.

Hadjimichalakis, Michael * 1969; PhD, 1970, University of Rochester; monetary theory and policy, macroeconomics, growth.

Huppert, Daniel D. * 1987, (Adjunct); PhD, 1975, University of Washington; economics and management of natural resources, especially marine fisheries.

Kochin, Levis A. * 1972; PhD, 1975, University of Chicago; macroeconomics, industrial organization.

Leffler, Keith B. * 1978; PhD, 1977, University of California (Los Angeles); industrial organization, microeconomics.

Thomas, Robert P. * 1968; PhD, 1964, Northwestern University; economic history.

Wong, Kar-Yiu * 1983; PhD, 1983, Columbia University; international trade and commercial policy.

Assistant Professors

Eicher, Theo S. * 1994; MA, 1991, MPhil, 1993, PhD, 1994, Columbia University; international development and macroeconomics with emphasis on economic growth.

Ellis, Gregory M. * 1988; BS, 1982, Oregon State University; PhD, 1992, University of California (Berkeley); environmental economics, economics of natural resources, industrial organization.

Khalil, Fahad A. * 1991; PhD, 1991, Virginia Polytechnic Inst. & State Univ; information economics and the theory of contracts.

Lawarree, Jacques P. * 1990; PhD, 1990, University of California (Berkeley); industrial organization, contract theory, game theory.

Ross, Elaine 1993; PhD, 1993, University of Pennsylvania; labor, development, applied microeconomics.

Zivot, Eric W. * 1993; PhD, 1992, Yale University; time series, econometrics, applied macroeconomics, empirical finance.

Senior Lecturers

Hayne, Paul T. * 1976; PhD, 1963, University of Chicago; evolution of economic theory and commercial society.

Salehi-Esfahani, Haideh 1990; PhD, 1985, University of Pennsylvania; international economics, economic development.

Turnovsky, Michelle H. L. 1987; MBA, 1965, Harvard University; PhD, 1978, Australian National University; international economics, economics of the European Union.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

ECON 100 Principles of Economics (5) I&S, QSR Fundamental concepts of economic analysis with application to contemporary problems. Cannot be taken for credit if 200 or 201 previously taken.

ECON 150 Quantitative Preparation for Economics and Business (5) I&S, QSR Introduces students to the kinds of quantitative analysis used in economics and business courses. Uses practical examples to build skills in graphical analysis, use of algebra, basic probability, introductory computer use, and quantitative reasoning.

ECON 200 Introduction to Microeconomics (5) I&S, QSR Analysis of markets: consumer demand, production, exchange, the price system, resource allocation, government intervention. Recommended: 1.5 years of high school algebra and passing score on placement test for MATH 111, or equivalent. Offered: AWSpS.

ECON 201 Introduction to Macroeconomics (5) I&S, QSR Analysis of the aggregate economy: national income, inflation, business fluctuations, unemployment, monetary system, federal budget, international trade and finance. Prerequisite: 200. Recommended: 1.5 years of high school algebra and passing score on placement test for MATH 111 or equivalent. Offered: AWSpS.

ECON 260 Economic History of the Western World (5) I&S Analysis of sources of long-run economic change from Neolithic times to the present. Develops basic analytical concepts of economic change and applies them to human history. First half of course addresses economic development up to settlement of American colonies and last half deals with American economic development.

ECON 299 Study Abroad: Economics (5, max. 10) I&S For participants in the Study Abroad program. Specific course content determined by assigned faculty member and announced in Study Abroad bulletins.

ECON 300 Intermediate Microeconomics (5) I&S Analysis of decisions by individuals and by firms and of outcomes in factor and product markets. Policy issues and applications. Prerequisites: 200, MATH 112 or 124, or equivalent. Offered: AWSpS.

ECON 301 Intermediate Macroeconomics (5) I&S Analysis of the determinants of the aggregate level of employment, output, prices, and income of an economy. Policy issues and applications with special reference to current monetary and fiscal policy. Prerequisites: 201, 300. Offered: AWSpS.

ECON 306 Topics in Economics (1-5, max. 10) I&S Provides undergraduates the opportunity to apply tools learned in introductory economics courses to topics of interest outside the standard curriculum. Topics vary. Prerequisites: 200, 201 or permission of instructor.

ECON 310 Microeconomics for Scientists and Engineers (5) I&S Analysis of consumers, firms, and industries using calculus of several variables. Examination of logical and mathematical basis of modern economic analysis. Prerequisites: 200, MATH 126 which may be taken concurrently.

ECON 311 Introduction to Economic Statistics (5) NW, QSR Statistical concepts and their application in economics. Students may receive credit for only one of 311 and STAT 220, 301, 311. Prerequisites: 200, MATH 111 or 120.

ECON 316 Urban Economics (5) I&S Application of economic analysis to urban trends, problems, and prescriptions, such as changing urban form and function, urban public finance, housing and renewal, poverty and race, transportation, and environmental problems. Prerequisite: 200 or equivalent. Offered: jointly with GEOG 316.

ECON 340 Labor Economics (5) I&S Introduction to analysis of labor markets; factors determining size, composition, and skill of labor force, demand for labor services, the pattern of wages including discrimination, impact of labor unions on wages and resource allocations. Analysis of public policy. Cannot be taken for credit if 443 or 444 previously taken. Prerequisite: 200, 201.

ECON 346 Economics of Health Care (5) I&S Economic analysis of the health-care sector of economy: organization, demand and supply factors, pricing practices, financing mechanisms—public versus private, impact of third party, insurance and prepayment, health and economic development. Prerequisite: 200 or equivalent.

ECON 347 Introduction to Population and Economic Dynamics (5) I&S Relationship between population and economics. Historical record, focusing on Europe and Japan and developing countries since World War II; consequences of population growth with respect to income per capita and other measures of economic welfare; ways in which economic factors affect fertility, migration, and mortality; population policy. Prerequisites: 200, 201.

ECON 350 Public Finance (5) I&S Elementary treatment of the theory of public finance. Theory of social welfare maximization, externalities and public goods, benefit-cost analysis, and evaluation of the

distributional and allocational effects of alternative types of taxes. Cannot be taken for credit if 450 or 451 previously taken. Prerequisites: 200, 201 or equivalent.

ECON 370 Introduction to International Economics (5) I&S International trade theory and commercial policy. Balance of payments and foreign exchange markets. World monetary arrangements and policy issues. Applications. Cannot be taken for credit if 471 or 472 previously taken. Prerequisites: 200, 201.

ECON 391 Economic Development (5) I&S Study of major factors contributing to the economic problems of developing countries and discussion of possible solutions. Includes applications of theories in economic development and international trade. Cannot be taken for credit if 491 previously taken. Prerequisites: 200, 201.

ECON 400 Advanced Topics In Microeconomics (5) NW Application of calculus to microeconomics. Development of comparative statics used in production and consumption theory, including derivation of the Slutsky equation and duality results. Prerequisites: 300, MATH 124. Recommended: MATH 126.

ECON 401 Advanced Topics In Macroeconomics (5) NW Application of mathematics to macroeconomics. Possible topics include economic dynamics and growth, rational expectations, real business cycle models, and New Keynesian approach. Prerequisites: 300, 301, and one year of calculus or permission of instructor.

ECON 403 The Economics of Property Rights (5) I&S Property rights as an economic concept. Delineation of rights as a subject of optimization. Formation of contracts to maximize the value of personal property. Formation of organizations to induce efficient use of resources and minimize losses to public domain. Prerequisites: 300. Recommended: two 400-level microeconomics courses.

ECON 404 Industrial Organization and Price Analysis (5) I&S Analysis of firm behavior in imperfectly competitive markets. Topics include monopoly, oligopoly, product differentiation, entry deterrence, and the role of asymmetric information. Game theoretic tools and empirical evidence used to analyze topics. Prerequisite: 300.

ECON 406 Undergraduate Seminar In Economics (5, max. 10) I&S Provides undergraduate student an opportunity to apply the tools of economic analysis in a critical examination of theoretical and empirical work. A list of topics is available in the departmental office. Prerequisites: 200 and permission of instructor.

ECON 407 Development of Economic Thought (5) I&S From the early modern period to the present. The main subjects treated are Adam Smith and the classical school, Karl Marx, the neoclassical reformulation and its critics, the impact of J. M. Keynes, and the evolution of economics in the twentieth century. Prerequisites: 200, 201, or equivalent.

ECON 409 Undergraduate Seminar In Political Economy (5, max. 10) I&S Marxian and public choice approaches to political economy. Explores the questions raised by each approach, the assumption(s) and testability of hypotheses, and applies these approaches to a number of problems in political economy. Prerequisites: 300, POL S 270 and permission of instructor. Offered: jointly with POL S 409.

ECON 421 Money, Credit, and the Economy (5) I&S Role of money and the banking system in the United States economy. Relation of money to inflation, interest rates, and business fluctuations. Monetary policy and Federal Reserve System. Prerequisites: 300, 301 or equivalent.

ECON 422 Investment, Capital, and Finance (5) I&S Intertemporal optimization: consumption and portfolio allocation decisions of households, investment and financing decisions of firms. Introduction to

financial decisions under uncertainty. Portfolio theory, asset pricing, options, and futures. Financial market institutions and efficiency. Prerequisite: 300, 311.

ECON 431 Government and Business (5) I&S Economic effects of various governmental regulatory agencies and policies. Antitrust legislation as a means of promoting desired market performance. Observed economic effects of policies intended to regulate business practices, control prices, conserve resources, or promote competition. Prerequisite: 300 or equivalent.

ECON 435 Natural Resource Economics (5) I&S Survey of the economics of renewable and non-renewable resources including fisheries, forest, minerals, and fuels. Optimal trade-offs between benefits and costs of resource use, including trade-offs between current and future use. Effects of property rights on resource use. Prerequisite: 300 or permission of instructor.

ECON 436 Economics of the Environment (5) I&S Microeconomic analysis of environmental regulation. The problem of social cost, policy instrument choice, enforcement of regulations, methods for damage assessment, and estimating benefits of environmental improvement. Prerequisite: 300 or instructor permission.

ECON 437 Economics of Biological Resources (5) I&S Application of economic concepts to biology and biological concepts to economics. Examination of theory of species maximization, parallels in behavior between humans and other biota, animal choices among alternative food sources, games animals play, evidence of risk aversion in animals. Prerequisite: 300 or permission of instructor.

ECON 443 Labor Market Analysis (5) I&S Determinants of employment and incomes in the United States: analysis of individual and firm decisions and of equilibrium in the labor market. Topics include decisions to work and retire, education and occupation choices, compensation, discrimination, poverty, unemployment and unions. Examination of policy issues affecting the labor market. Prerequisite: 300.

ECON 444 Topics In Labor Market Analysis (5) I&S In-depth analysis of special topics in the operation of labor markets and public policies affecting incomes and employment. Course content varies by instructor. Prerequisite: 300.

ECON 445 Income Distribution and Public Policy (5) I&S Income distribution implications and economic effects of public policies toward unemployment, illness, industrial accidents, old age, poverty, and age, sex, or race discrimination. Prerequisites: 200, 201.

ECON 447 Economics of Gender (5) I&S Microeconomic analysis of the sources of gender differences in earnings, labor force participation, occupational choice, education, and consumption. Economic theories of discrimination, human capital, fertility and intrahousehold resource allocation. Economics of the family in developed and developing countries. Prerequisite: 300 or permission of instructor. Offered: jointly with WOMEN 447.

ECON 450 Public Finance: Expenditure Policy (5) I&S Application of normative microeconomic theory to analysis of government expenditures. Rationale for government economic activity, collective choice, public goods, and externalities, income redistribution, public sector pricing, and specific expenditure programs. Prerequisite: 300.

ECON 451 Public Finance: Tax Policy (5) I&S Microeconomics of taxation: efficiency, incidence, effect on distribution of income, personal and corporate income taxes, sales and consumption taxes, taxation of property and estates. Prerequisite: 300.

ECON 452 Economic Theory as Applied to the Political System (5) I&S Explanation and evaluation of political system, using elementary economics

theory. Alternative voting rules, political effectiveness of various types of groups, causes and consequences of logrolling, and bureaucratic organizations. Prerequisite: 200 or equivalent. Offered: jointly with POL S 416.

ECON 453 State and Local Public Finance (5) I&S Analysis of Washington state taxes. Considers equity and efficiency in recent tax changes. Examines major budgeted Washington state programs to determine beneficiaries, who bears the costs, and the income transfers that occur in these programs. Prerequisite: 300 or equivalent.

ECON 454 Cost-Benefit Analysis (5) I&S Theory and practice of cost-benefit analysis of public sector projects and policies. Welfare criteria, investment criteria, shadow prices, social discount rate, marginal-willingness-to-pay for non-market goods, social risk, and special topics. Prerequisite: 300.

ECON 460 Economic History of Europe (5) I&S Origins of the modern European economy; historical analysis of economic change and growth from medieval times that stresses the preconditions and consequences of industrialization. Recommended: 200, 201. Offered: jointly with HIST 481.

ECON 462 Economic History of the United States to the Civil War (5) I&S Systematic study of the changing pre-Civil War economic conditions and the consequences of these changes for the American society. Prerequisites: 200, 201, or equivalent.

ECON 463 Economic History of the United States From the Civil War to the Present (5) I&S Systematic study of the changing economic conditions since the Civil War and the consequences of these changes for the American society. Prerequisites: 200, 201, or equivalent.

ECON 466 Economic History of China: 1840-1949 (5) I&S Study of the post-1840 Chinese economy, with a brief introduction to the socioeconomic background of the earlier period. Explanations of China's long economic stagnation, and analyses of the impact of external factors and the role of the government in China's economic development before 1949. Recommended: 200, 201.

ECON 468 China's Economic Reforms—Integration Into World Economy (5) I&S Systematic survey of China's economic reforms since 1978, including China's increasing integration into the world economy. Prerequisite: 466 or 490 or permission of instructor. Offered: jointly with SISEA 468.

ECON 471 International Trade (5) I&S Theory of comparative advantage and different models of international trade. Trade and welfare. Factor mobility and trade flows. Economic integration. Theory and practice of commercial policy. Prerequisites: 300, 301.

ECON 472 International Macroeconomics (5) I&S International monetary theory and open economy macroeconomics. Balance of payments and foreign exchange markets. Different exchange rate arrangements and their adjustment mechanisms. Money and international capital movements. Policy issues. The international monetary system. Prerequisites: 300, 301.

ECON 473 Topics In International Trade (5) I&S Advanced theory of trade and analysis of government trade policies. International trade and factor mobility. Theory of commercial policy. Prerequisite: 471.

ECON 475 Economics of the European Union (5) I&S Analysis of economic issues relating to the European union. Explores the institutional aspects, the attempt to coordinate social and economic policies—welfare, employment, commercial, fiscal, and monetary—and the economic linkages between the European Union and the rest of the world. Prerequisites: 300 and 301.

ECON 481 Introduction to Mathematical Statistics (5) NW Probability, generating functions, method,

Jacobians, Bayes theorem, maximum likelihoods, Neyman-Pearson efficiency, decision theory, regression, correlation, bivariate normal. Students receiving credit for either STAT 341 or 390 may not receive credit for 481. Prerequisites: 311, STAT 311, or equivalent; MATH 124, 125, 126; and a course in linear algebra, which may be taken concurrently. Offered: jointly with STAT 481.

ECON 482 Econometric Methods (5) NW Application of statistical modeling to empirical work in economics. A mixture of theory and applied computer work. Primary focus is regression analysis. Prerequisites: 300, 311, or STAT 311.

ECON 483 Applied Econometric Modeling (5) NW Provides undergraduates the opportunity to learn econometric model building for a particular problem while applying the theory learned in various courses to specific economic cases. Students estimate, test, and forecast economic models. Extensive use of the computer and econometric programs. Prerequisites: 300, 301, and 311.

ECON 485 Game Theory with Applications to Economics (5) NW Introduction to the main concepts of game theory: strategy, solution concepts for games, strategic behavior, commitment, cooperation, and incentives. Application to economics oligopoly theory, bargaining theory, and contract theory. Prerequisites: MATH 112 or 124, junior standing. Recommended: 300, 404.

ECON 490 Comparative Economic Systems (5) I&S Study of resource allocation, growth, and income distribution in capitalist, market socialist, and centrally planned economies. Prerequisites: 300, 301.

ECON 491 Issues in Economic Development (5) I&S Examines factors contributing to the economic problems of developing countries and possible solutions. Theory and applications in economic development and international trade. Prerequisites: 300, 301.

ECON 494 Economy of Japan (5) I&S Analysis of the economic growth of Japan since about 1850 to the present. The reasons for rapid industrialization, various effects of sustained economic growth, and significant contemporary issues are investigated. Prerequisites: 200 and 201, or permission of instructor.

ECON 495 Economic Transformation of Russia and Eastern Europe (5) I&S Analytical survey of the economic institutions and economic structures of the transforming socialist economies. Socialist resource allocation. Market institutions. Structural change and the sequencing of economic reform. Primary focus on Russia and Eastern Europe. Prerequisite: 300, 301, or permission of instructor.

ECON 496 Honors Seminar (5) I&S Honors and other students in high standing have the opportunity to develop research techniques, to pursue topics in breadth and depth, and to apply tools of economic analysis to selected topics in economic theory and current issues of national and international economic policy. For seniors only. Prerequisite: permission of undergraduate adviser.

ECON 497 Honors Directed Study (5) Students write their honors thesis on the topic chosen in the Honors Seminar working under the previously arranged supervision of an economics faculty adviser. Prerequisite: 496.

ECON 498 Senior Seminar (5) I&S Advanced undergraduate research in economics. Students formulate some underlying economic issue, organize its study, gather necessary information, and analyze results. Does not satisfy graduation requirement for the major. Prerequisites: 300, 301, and at least two 400-level ECON classes.

ECON 499 Undergraduate Research (1-5, max. 10) May not be applied toward an advanced degree. Prerequisite: permission of undergraduate adviser.

Courses for Graduates Only

ECON 500 Microeconomic Analysis I (4) Duality and comparative statics analysis. Consumer and firm behavior. Prerequisite: 300 or permission of instructor.

ECON 501 Microeconomic Analysis II (4) Theory of markets and general equilibrium; welfare economics. Prerequisite: 500.

ECON 502 Macroeconomic Analysis I (4) An introduction to advanced macroeconomics. Theories of income, employment, inflation, and growth. Prerequisites: 300 and 301 or permission of instructor.

ECON 503 Macroeconomic Analysis II (4) Rational expectations in macroeconomic models. Dynamic optimizing models under uncertainty. Empirical examination of consumption, asset-pricing, and real business cycles.

ECON 505 Microeconomic Theory: Problems and Applications (3) Seminar for graduate students who have completed the basic core sequence in price theory. Designed to extend the student's analytic and problem-solving abilities by working systematically through a programmed set of readings and problems. The material includes both formal analytical techniques and applications of economic theory. Prerequisite: 501.

ECON 507 History of Economic Thought (3) Classical and neoclassical economics with emphasis on alternative conceptions of the nature and significance of economic science.

ECON 508 Microeconomic Analysis III (4) The role of strategic behavior and uncertainty in microeconomic analysis. Introduction to game theory and information economics. Prerequisites: 500, 501.

ECON 509 Macroeconomics III (4) Modern macroeconomic dynamics, presenting a range of approaches based on intertemporal optimization. Representative agent models with special emphasis on the analysis of government policy. More advanced discussion of economic growth. Prerequisite: 502, 503 or equivalent.

ECON 511 Advanced Microeconomic Theory: Selected Topics (3, max. 12) Seminar in advanced microtheory. Selected topics of special interest and significance. Prerequisites: 500, 501.

ECON 512 Advanced Macroeconomic Theory: Selected Topics (3, max. 12) Seminar in advanced macrotheory. Selected topics of special interest and significance.

ECON 514 General Equilibrium Analysis (3) Study of the existence, uniqueness, and stability of general equilibrium models under the assumptions of competition. Emphasis is on recent developments in the literature with consideration given to both positive and normative economics.

ECON 515 Special Topics in Mathematical Economics (3, max. 12)

ECON 516 Introduction to Noncooperative Game Theory (3) Study of both pure game theory and its applications to such problems as oligopoly pricing, non-cooperative bargaining, entry deterrence, reputation phenomena. Focus on game theory as a modeling tool as opposed to a body of known results. Prerequisite: 508.

ECON 520 The Economics of Property Rights (3) Application of standard economic theory to analyze various forms of property rights as constraints of competition; the costs associated with delineation and enforcement of rights; the costs of negotiating and enforcing contracts for right transfers; resource allocation and income distribution implied by different property right and transaction cost constraints. Prerequisites: 500 and 501, or permission of instructor.

ECON 530 Government Regulation of Business (3) Public policy in the United States with respect to industrial organization and business conduct. Economic issues in antitrust policy emphasized. Prerequisites: 500, 501.

ECON 531 Theory of Industrial Organization I (3) Analysis of the monopolist's problem in different choice variables. Topics include the theory of the firm; pricing; choice of quality and advertising; price discrimination; and vertical control. Prerequisites: 500, 501.

ECON 532 Theory of Industrial Organization II (3) The application of game theory to problems of strategic behavior that arise in the study of imperfectly competitive markets. Topics include vertical integration, short- and long-run price competition, folk theorems, empirical tests of oligopoly pricing models, entry deterrence, research and development, and product differentiation. Prerequisites: 500, 501.

ECON 533 Economic Theory of Regulation (3) Incentive mechanisms and rate designs for promoting optimal production and pricing from natural monopolies. Role of asymmetric information, auditing, and monitoring is emphasized. Competing theories of regulatory behavior examined. Prerequisites: 500, 501.

ECON 535 Economics of Natural Resources I (3) First half of integrated two-course sequence. Non-renewable resource extraction and exploration, including effects of market structure, uncertainty, and taxation. Externality theory and pollution-control policies. Prerequisites: 500, 501, or permission of instructor.

ECON 536 Economics of Natural Resources II (3) Second half of integrated two-course sequence. Renewable resources, including fisheries and forests. Valuation of environmental amenities. Prerequisite: 535.

ECON 537 Economic Aspects of Marine Policy I (3) Development of pertinent economic concepts and their application to selected topics in marine policy decision making. Prerequisite: SMA 500 or permission of instructor. Offered: jointly with SMA 537.

ECON 538 Economic Aspects of Marine Policy II (3) Development of pertinent economic concepts and their application to selected topics in marine policy. Prerequisite: 537 or permission of instructor. Offered: jointly with SMA 538.

ECON 539 Economics of Natural Resources Seminar III (3) Selected advanced topics in the economics of natural resources and environmental regulation. Topics may include environmental regulation as a problem in optimal mechanism design, enforcement of regulations, regulatory regimes for common property resources, and the measurement of market power in nonrenewable resource industries. Prerequisites: 536.

ECON 541, 542 Labor Economics (3, 3) Theoretical and empirical analysis of the labor market. The determinants of labor supply and demand, human capital investment, the pattern of compensation, employment contracts and incentives, unemployment and labor market dynamics.

ECON 543 Population Economics (3) Economic determinants and consequences of population growth; emphasis on formal theoretical models and on empirical analysis. Introduction to: formal demography; welfare economics of population change, including analyses of population effects on consumption, savings, investment, and technical change; and determinants of mortality, fertility, and migration. Prerequisites: 500, 501, or permission of instructor.

ECON 548 Health Economics (3) Theoretical and empirical models of the demand for health and health care; supply of health care from physicians and hospitals; government programs that subsidize health care; occupational health; cost-benefit analyses of preventive health care and new medical technologies. Prerequisites: graduate-level microeconomics, HSERV 585, or permission of instructor.

ECON 547 Health Policy Economics (3) Selected topics in health economics, including risk and insurance, medical malpractice, the market for physician services, and industry regulation. Prerequisite: a course in intermediate microeconomics or permission of instructor. Offered: jointly with HSERV 587.

ECON 550 Public Finance: Expenditure Policy (3) Theory of public finance with emphasis on public expenditures. Social welfare maximization, public goods and externalities, decreasing cost industries, theory of collective choice, second-best analysis. Prerequisite: 500, 501, or permission of instructor.

ECON 551 Public Finance: Tax Policy (3) Theory of public finance with emphasis on taxation. Second-best analysis, optimal taxation, general equilibrium incidence analysis, issues in personal income taxation and corporate income taxation. Prerequisite: 500, 501 or permission of instructor.

ECON 554 Advanced Cost-Benefit Analysis (3) Techniques of, and theoretical foundation for, cost-benefit analysis as applied to the public sector. Prerequisite: 500, 501, or PB AF 553. Offered: jointly with PB AF 554.

ECON 556 Seminar in Urban Economics (3) Use of economic theory to explain land-use trends, transportation, housing and renewal, the ghetto, and the public economy in urban areas. Prerequisites: 300, 301, or equivalent. Offered: jointly with GEOG 556.

ECON 571 International Trade Theory (3) Comparative advantage, resource allocation, income distribution, and foreign trade. Different theories of trade, with or without perfect competition and constant returns. International factor mobility. Prerequisites: 500, 501.

ECON 572 International Financial and Monetary Economics (3) Analysis of open economy macro models with emphasis on exchange rates and balance of payments determination. Prerequisites: 502, 503.

ECON 573 International Commercial Policy (3) Analysis of welfare aspects of international trade and factor mobility. Costs and benefits of protection; implications of different government policies. Import competition and response. Prerequisite: 571 or permission of instructor.

ECON 574 International Macroeconomics (3) Surveys recent developments in international macroeconomics, placing particular emphasis on the dynamic aspects. One sector, multisector, and two-country international models discussed. Fiscal issues treated in depth. Stochastic aspects introduced and related to the literature on international real business cycles. Prerequisite: 509 or equivalent. Offered:

ECON 580, 581, 582 Econometrics I, II, III (4, 4, 4) Methods, tools, and theory of econometrics as the basis for empirical investigation in economics. Specification, testing, and use of econometric models with reference to examples in the literature. Prerequisite: 580 for 581; 581 for 582.

ECON 583 Econometric Theory I (3) Estimation and testing in linear and nonlinear regression models. Asymptotic theory, bootstrapping. Theoretical developments are reinforced with a variety of empirical examples and applications. Prerequisites: 580, 581, 582 or equivalent.

ECON 584 Econometric Theory II (3) Continuation of 583. Analysis of stationary and nonstationary, univariate, and multivariate time series models. Emphasis on empirical applications. Prerequisite: 583.

ECON 585 Applied Microeconomics (3) Econometric issues that arise in applied microeconomic research. Topics include the use of panel data and models with limited and qualitative dependent variables. Prerequisite: 582 or equivalent.

ECON 590 Theory and Practice of Economic Planning (3) Analysis of incentives for, and methods of, government intervention in socialist and developing countries, with a focus on microeconomic issues.

ECON 591 Theoretical Issues in Economic Development (3) Analysis of issues in economic development with application to the less-developed countries of the world today. Prerequisites: 500, 501, or permission of instructor.

ECON 592 Development Policy (3) Theoretical and empirical analysis of macroeconomic policies pursued by developing countries. Topics include the determination of exchange rates and relative prices in small economies; the examination of government spending, taxation, banking, trade, and labor market policies; and the evaluation of market-oriented economic reform programs. Prerequisites: 503. Recommended: 591.

ECON 595 Analysis of the Transforming Socialist Economies (3) Applications of economic analysis to the economic problems of transforming socialist economies. Economic institutions. The role of the state. Privatization and the behavior of decentralized organizations. Integration into the world market. Prerequisite: micro- and macroeconomic theory and permission of instructor.

ECON 600 Independent Study or Research (*) Credit/no credit only.

ECON 601 Internship (3-9, max. 9) Credit/no credit only.

ECON 602 Teaching Introductory Economics (1) Examines problems encountered in preparing and presenting courses in introductory economics. Credit/no credit only.

ECON 800 Doctoral Dissertation (*) Credit/no credit only.

English

A101 Padelford

Undergraduate Program

Director, Undergraduate Programs
Malcolm Griffith
A11 Padelford

Advisers
A2B Padelford

The Department of English offers courses in English, American, and related literatures; literary history and criticism; expository and creative writing; and related subjects. Courses in the English curriculum cover a wide range of interests in the study of cultural and intellectual history, pertinent to many vocations and careers, on the premise that a knowledge of language and literature is fundamental to a university education. Department programs include a study abroad program in London each spring quarter, an honors program, and an internship program.

Bachelor of Arts

Admission Requirements: 45 quarter-hour credits (or equivalent) completed with at least a 2.00 overall GPA; 2.50 overall English GPA; either 10 credits from ENGL 210, 211, 212, 213, or 10 credits from ENGL 228, 229, 230, 250. Admission is competitive; completion of these requirements does not guarantee admission. Students apply to the English Advising Office, A2B Padelford, during the first two weeks of autumn, winter, and spring quarters.

Major Requirements

No credits in 100-level courses and only 20 credits in 200-level courses may be counted toward the major. Lists of approved courses referred to in the following descriptions are available from the English Advising Office, A2B Padelford.

Language and Literature: A minimum of 63 credits: 30 credits in approved literary period courses [including at least 5 credits in each of the following five periods and an additional 5 credits in period (1) or (2)]: (1) early period, (2) seventeenth- and eighteenth-century English literature, (3) nineteenth-century English literature, (4) American literature to 1917, (5) twentieth-century British and American literature; one approved literature course taught in another department, including courses jointly listed with English, either in English translation or in the original language; 25 elective credits in English courses; 5 credits for senior seminar (ENGL 498). No more than 5 credits in expository or creative writing courses may be counted toward the major.

Creative Writing: A minimum of 63 credits: 25 credits in creative or expository writing courses, at least 15 of which must be at the 300-400 levels and must include course work in at least two forms (i.e., poetry, drama, short story, novel, expository writing); 30 credits distributed in approved literary period courses (see above under Language and Literature); one approved literature course taught in another department, including courses jointly listed with English, either in English translation or in the original language; 5 credits for senior seminar (ENGL 498).

Graduate Program

John Coldewey, Graduate Program Coordinator

The Department of English offers a complete program of graduate courses and seminars designed to provide aspirants for the Master of Arts and Doctor of Philosophy degrees with a knowledge of English literature and language and the necessary scholarship for training in literary criticism and theory, literary history, and English language study, including rhetoric and composition. It is possible to pursue a literature or language study emphasis. The Master of Fine Arts program in creative writing emphasizes projects in imaginative writing in fiction and poetry, supported by courses in criticism and literary periods and types. A special degree program, the Master of Arts for Teachers, is offered for English teachers in secondary schools and community colleges and a Master of Arts for Teachers (English as a Second Language) for those interested in teaching English to speakers of other languages. The graduate program permits completion of master's degree requirements in four to six quarters and doctoral degree requirements in five years (including the master's degree). In a typical five-year program, a student is encouraged to complete course requirements (75 credits) during the first three years, the General Examination for the doctorate in the fourth year, and the dissertation in the fifth year. Those admitted with a master's degree from another university can complete the doctorate in four years: two years of course work, exam year, dissertation year.

Financial Aid

The department annually awards 20 or more new teaching assistantships. To be considered for the following autumn, applicants must submit an assistantship application and supporting materials for admission to the graduate program by January 15. A statement of purpose, three recommendations, the GRE general test, the GRE subject test (literature in English) [except M.F.A., M.A.T. (E.S.L.)] and a critical writing sample are required [except M.A.T. (E.S.L.)].

Master of Arts

Admission Requirements: Bachelor of Arts degree. Major in English equivalent to that awarded by the UW preferred. Graduate Record Examination general test and subject test (literature in English). Three letters of recommendation, statement of purpose, and a critical writing sample.

Graduation Requirements: Intermediate-level proficiency in a language other than English. 40 credits, including 30 credits in graduate English seminars. For students continuing to the doctoral program, a 10-credit master's essay. For a terminal master's degree, students may substitute 10 additional credits in graduate English seminars for the master's essay. A maximum of 10 credits may be transferred from an accredited graduate program elsewhere.

Master of Fine Arts

Admission Requirements: Bachelor of Arts degree. Graduate Record Examination general test, three letters of recommendation, statement of purpose, a critical writing sample, and a creative writing sample.

Graduation Requirements: Intermediate-level proficiency in a language other than English. 55 credits, including 20 credits in creative writing, 15 credits in graduate English seminars (5 credits must be from an approved course in criticism), 5 elective credits, 15 thesis credits, M.F.A. essay. Final oral examination.

Master of Arts for Teachers

Admission Requirements: Same as for the Master of Arts degree, but usually including prior teaching experience.

Graduation Requirements: 45 credits, of which 25 must be in courses numbered 500 or above; including at least one course each in English language or linguistics, rhetoric and/or composition, literary criticism or critical theory, and literature; three courses must have a stated orientation on teaching English; 5 credits of M.A.T. essay. In addition to the 45 credits, a student with no regular or formal teaching experience is required to complete at least 6 credits of ENGL 601 (Internship). 15 of these may be taken outside the department in courses related to the teaching of English, subject to approval. A maximum of 10 credits may be transferred from an accredited graduate program elsewhere.

Master of Arts for Teachers (English as a Second Language)

Admission Requirements: Bachelor of Arts degree, Graduate Record Examination general test, statement of purpose, three letters of recommendation. Students without training in linguistic method and theory must take LING 400 as a prerequisite for 400-level linguistics courses.

Graduation Requirements: 45-54 credits, including ENGL 571, 572, 574, 576; LING 448 or 451, 445 or 461; three courses from ENGL 441, 465, 466, 499, 560, 561, 562, 563, 564, 567, 569, 575, LING 433/ANTH 464, LING 447/PSYCH 457, LING 452, 462; one elective course; 3-6 credits of ENGL 570. Intermediate-level proficiency in a language other than English.

Doctor of Philosophy

Admission Requirements: By petition to Graduate Studies Committee upon completion of the M.A. degree option in literature. Students with recent master's degrees from other institutions are admitted at the post-master's level following the guidelines for admission to the M.A. option and must complete two quarters before petitioning the Graduate Studies Committee for admission to the doctoral program. Students transferring with a master's degree from other institutions may be required to submit an equivalent to the master's essay. Students with M.F.A., M.A.T., or M.A.T. (E.S.L.) degrees from the University must complete course work and language requirements for the M.A. degree option and submit an equivalent to the master's essay.

Graduation Requirements: 75 graded credits of electives in graduate English seminars as advised by the student's Supervisory Committee. Students with a recent master's degree from another university may count up to 30 credits from the master's program, upon approval of the Director of Graduate Studies. Students with a master's degree from the UW may count up to 40 credits in courses taken before admission to the doctoral program. Doctoral students may count up to three graduate courses taken in other departments toward fulfilling degree requirements. Fluency in at least one language other than English, plus whatever additional language study the Supervisory Committee advises. Written examinations for literature emphasis: (1) historical period, (2) specialized field of study, (3) second period or genre; written examinations for language emphasis: (1) major approach to English language study, (2) second approach to language study, (3) textual focus—can be literary period; an oral General Examination on an individualized topic; 27 credits of ENGL 800 (Dissertation) and a Final Examination based on the dissertation.

Faculty

Chair

Thomas Frank Lockwood

Professors

Alexander, Edward * 1962; MA, 1959, PhD, 1963, University of Minnesota; romantic and Victorian literature.

Blake, Kathleen * 1971; PhD, 1971, University of California (San Diego); Victorian literature, children's literature, women's studies.

Brown, Marshall J. * 1988; PhD, 1972, Yale University; 18th and 19th-century literature, literary theory, music and literature.

Burns, Wayne 1948, (Emeritus); MA, 1940, Harvard University; PhD, 1946, Cornell University; Victorian literature.

Butler, Johnella E. * 1987, (Adjunct); EdD, 1979, University of Massachusetts.

Coldewey, John C. * 1972; PhD, 1972, University of Colorado (Boulder); Renaissance literature, medieval drama.

Dillon, George L. * 1986; PhD, 1969, University of California (Berkeley); rhetoric, composition.

Dunn, Richard J. * 1967; PhD, 1964, Case Western Reserve University; Victorian literature, English novel.

Fowler, David C. * 1952, (Emeritus); PhD, 1949, University of Chicago; medieval literature, comparative religion.

Frey, Charles Hubbard * 1976; PhD, 1971, Yale University; Renaissance literature, Shakespeare.

Gerstenberger, Donna * 1960, (Emeritus); PhD, 1958, University of Oklahoma; twentieth-century literature, Anglo-Irish literature, feminist criticism.

Harris, Markham 1946, (Emeritus); MA, 1931, Williams College; fiction writing.

Heilman, Robert B. 1948, (Emeritus); MA, 1930, Ohio State University; MA, 1931, PhD, 1935, Harvard University; drama.

Irmscher, William F. * 1960, (Emeritus); PhD, 1950, Indiana University; rhetoric and theory of composition.

Jeffords, Susan E. * 1985; MA, 1977, PhD, 1981, University of Pennsylvania; feminist theory, American popular culture, and the representation of Vietnam.

Johnson, Charles R. * 1976; MA, 1973, Southern Illinois University; fiction writing.

Jones, Frank W. 1955, (Emeritus); PhD, 1941, University of Wisconsin; MA, 1955, Oxford University (UK); translation, twentieth-century theatre, poetry.

Kaplan, Sydney J. * 1971; PhD, 1971, University of California (Los Angeles); twentieth-century literature, women writers, feminist criticism.

Kenney, Richard L. * 1987; BA, 1970, Dartmouth College; poetry writing.

Korg, Jacob * 1955, (Emeritus); PhD, 1952, Columbia University; Victorian, twentieth-century literature.

Lockwood, Thomas Frank * 1967; PhD, 1967, Rice University; eighteenth-century literature.

Matchett, William H. * 1954, (Emeritus); PhD, 1957, Harvard University; Renaissance literature, Shakespeare.

McCracken, J. David * 1966; PhD, 1966, University of Chicago; eighteenth-century literature.

McElroy, Colleen W. * 1972; PhD, 1973, University of Washington; Black literature, women writers, poetry writing.

McHugh, Heather * 1982; MA, 1973, University of Denver; writing and close reading of poetry, form in nature and art.

Modiano, Raimonda * 1978; PhD, 1973, University of California (San Diego); romanticism.

Posnock, Ross * 1983; PhD, 1980, Johns Hopkins University; American literature.

Reinert, Otto * 1956, (Emeritus); PhD, 1952, Yale University; comparative literature, eighteenth-century literature.

Russ, Joanna * 1977, (Emeritus); MFA, 1960, Yale University; fiction writing.

Sale, Roger H. * 1962; PhD, 1957, Cornell University; Renaissance literature.

Shavero, Steven * 1984; PhD, 1981, Yale University; literary theory, romantic poetry, post-modernism.

Shulman, Robert * 1961; PhD, 1959, Ohio State University; American literature.

Sliberstein, Sandra V. * 1982; PhD, 1982, University of Michigan; TESL, critical theory, discourse analysis, sociolinguistics, language and culture.

Simonson, Harold P. * 1967, (Emeritus); PhD, 1958, Northwestern University; American literature.

Stevick, Robert D. * 1962; PhD, 1956, University of Wisconsin; medieval language and literature.

Streitberger, William R. * 1973; PhD, 1973, University of Illinois; Renaissance literature, textual criticism, paleography.

Tollefson, James W. * 1984; PhD, 1978, Stanford University; English as a second language, language planning.

Wagoner, David R. * 1957; MA, 1949, Indiana University; twentieth-century literature, fiction and poetry writing.

Wong, Shawn H. * 1984; MA, 1974, San Francisco State; creative writing, Chinese-American area studies.

Associate Professors

Abrams, Robert * 1979; PhD, 1973, Indiana University; American literature.

Allen, Carolyn * 1972; MA, 1966, Claremont Graduate School; PhD, 1972, University of Minnesota; twentieth-century literature, women writers, contemporary critical theory.

Altieri, Joanne S. * 1977; PhD, 1969, University of North Carolina; Shakespeare studies, including early seventeenth-century theatre more generally.

Bosworth, David L. * 1984; BA, 1969, Brown University; fiction writing, modern fiction and poetry, American Puritans.

Brenner, Gerald J. * 1966; PhD, 1969, University of New Mexico; American literature, fiction writing.

Butwin, Joseph M. * 1978; PhD, 1971, Harvard University; Victorian literature.

Cummings, Katherine * 1985; PhD, 1985, University of Wisconsin; feminist, psychoanalytical, and literary theory, modern and contemporary literature.

Duckett, Margaret R. 1947, (Emeritus); MA, 1941, University of North Carolina; American literature.

Dunlop, William M. * 1962; MA, 1965, Cambridge University (UK); Shakespeare, nineteenth-century literature, poetry writing.

Fisher, Alan S. * 1968; PhD, 1969, University of California (Berkeley); Renaissance, seventeenth- and eighteenth-century literature, history of literary criticism.

Griffith, John W. * 1968; PhD, 1969, University of Oregon; American literature.

Handwerk, Gary J. * 1984; PhD, 1984, Brown University; literary theory, English and Irish nineteenth- and twentieth-century narrative.

Hudson, Lois Phillips * 1969, (Emeritus); LittD, 1965, North Dakota State University; fiction writing.

LaGuardia, Eric Henry * 1961; PhD, 1961, University of Iowa; Renaissance literature.

Longyear, Christopher R. * 1972; PhD, 1961, University of Michigan; linguistics.

Mussetter, Sally Ann * 1978; PhD, 1975, Cornell University; medieval language and literature.

Palomo, Dolores J. * 1971, (Emeritus); PhD, 1972, State University of New York (Buffalo); Renaissance literature, women writers.

Patterson, Mark R. * 1981; PhD, 1981, Princeton University; American literature.

Remley, Paul G. * 1988; PhD, 1990, Columbia University; Old and Middle English, medieval languages and literatures, critical theory.

Searle, Leroy F. * 1977; MA, 1968, PhD, 1970, University of Iowa; twentieth-century literature, critical theory, American studies.

Shields, David * 1988; MFA, 1980, University of Iowa; fiction writing, screen writing, 20th century literature, autobiography, mass media, film.

Smith, Eugene H. * 1958, (Emeritus); PhD, 1963, University of Washington; rhetoric and theory of composition.

Stanton, Robert B. * 1956, (Emeritus); PhD, 1953, Indiana University; American literature.

Toolan, Michael J. * 1986; PhD, 1981, Oxford University (UK); the linguistic analysis of discourse in English.

Vandenberg, Sara J. * 1980; PhD, 1969, Yale University; Renaissance and seventeenth-century literature.

Vaughan, Miceal F. * 1973; PhD, 1973, MA, 1973, Cornell University; medieval language and literature.

Wald, Priscilla B. 1995; MA, 1981, MPhil, 1983, PhD, 1989, Columbia University; concept of authorship in modern American literature.

Webster, John M. * 1972; PhD, 1974, University of California (Berkeley); Renaissance literature.

Yaggy, Elinor M. 1940, (Emeritus); MA, 1939, University of Idaho; PhD, 1946, University of Washington; American literature, expository and fiction writing.

Assistant Professors

Crane, Gregg David 1995; MA, 1981, University of California (Los Angeles); JD, 1986, University of California (San Francisco); PhD, 1995, University of California (Berkeley); American literature.

Dean, Timothy J. 1994; MA, 1992, PhD, 1994, Johns Hopkins University; modernism/postmodernism, literary and cultural theory, gender studies, poetry.

Doyle, Anne E. * 1987; PhD, 1990, University of Illinois; composition, rhetoric.

Goodlad, Lauren M. E. 1994; MA, 1986, New York University; MPhil, 1989, PhD, 1994, Columbia University; Victorian literature and culture, contemporary culture, cross-disciplinary literary/cultural theory.

Griffith, Malcolm A. * 1966; PhD, 1966, Ohio State University; twentieth-century literature, modern criticism, American literature.

Guerra, Juan C. 1990; MA, 1983, PhD, 1992, University of Illinois; rhetoric and composition.

Moody, Jocelyn K. 1991; MA, 1980, University of Wisconsin; PhD, 1993, University of Kansas; nineteenth-century American, African-American, and women's literature, autobiography.

Riggenbach, Heidi R. * 1989; PhD, 1989, University of California (Los Angeles); teaching English as a second language, discourse analysis, sociolinguistics.

Simpson, Caroline Chung 1994; MA, 1989, University of Houston; PhD, 1994, University of Texas (Austin); Asian American literature and culture, postwar fiction and film.

Sonenberg, Maya * 1993; MA, 1984, Brown University; fiction writing, twentieth-century fiction, postmodern fiction, women writers.

Stygall, Gail * 1990; PhD, 1989, Indiana University; rhetoric and composition, English language linguistics, law and literature.

Senior Lecturers

Beyer, Catharine H. 1984; MA, 1970, University of Michigan; expository and interdisciplinary writing.

Graham, Joan Adelle 1974; MA, 1972, University of Washington; expository and interdisciplinary writing.

Hatch, Deborah 1979; MA, 1976, PhD, 1981, University of Massachusetts; expository and interdisciplinary writing.

Lecturers

George, E. Laurie 1991; PhD, 1984, University of Oregon; expository/computer-aided writing, American literature, feminist linguistics, pedagogy.

McNamara, Robert J. 1985; PhD, 1985, University of Washington; expository and interdisciplinary writing.

Shabetai, Karen J. 1984; MA, 1982, PhD, 1984, University of California (San Diego); eighteenth-century literature, romanticism.

Simmons-Onell, Elizabeth 1985; PhD, 1988, University of Washington; expository and interdisciplinary writing, service learning, education and tutoring.

Wacker, Norman J. 1989; MA, 1976, PhD, 1986, University of Washington; expository and interdisciplinary writing.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

ENGL 100 Intermediate ESL for International Students (5) Offered as two separate sections: one for reading and written grammar, sentence patterns, and paragraph coherence; the other for basic listening and conversation management skills related to academic situations. Sections may be taken concurrently. Special fee required. Prerequisite: placement examination. Credits averaged in GPA but do not count toward graduation.

ENGL 101 High Intermediate ESL for International Students (5) Offered as two separate sections: one for reading and essay-writing skills, particularly developing controlling idea and support; the other for listening and speaking skills related to academic lectures and class discussions. Sections may be taken concurrently. Special fee required. Prerequisite: placement

examination. Credits averaged in GPA but do not count toward graduation.

ENGL 102 Advanced ESL for International Students (5) Offered as two separate sections: one for writing research papers, including library research skills and research paper format and organization; the other for speaking skills for international teaching assistants: language behaviors related to lecturing, classroom management, and teacher-student interaction. Special fee required. (No special fee for international teaching assistants section.) Prerequisite: placement examination. Credits averaged in GPA but do not count toward graduation.

ENGL 103 Introduction to Writing for EOP/SSS Students (5) Development of writing skills necessary to produce college-level short and medium-length essays. Sequence of five essays designed to develop personal voice and competence in writing for academic disciplines. Prerequisite: placement examination or permission of instructor.

ENGL 104-105 Introductory Composition (5-5) C Development of writing skills: sentence strategies and paragraph structures. Expository, critical, and persuasive essay techniques based on analysis of selected readings. For Educational Opportunity Program students only, upon recommendation by the Office of Minority Affairs.

ENGL 106 Practical Forms of Writing (5) C Instruction in writing essay examinations, reports, reviews, and research papers. For Educational Opportunity Program students only, upon recommendation by the Office of Minority Affairs. Prerequisites: 104-105, or special placement.

ENGL 111 Composition: Literature (5) C Study and practice of good writing; topics derived from reading and discussing stories, poems, essays, and plays.

ENGL 121 Composition: Social Issues (5) C Study and practice of good writing; topics derived from reading and discussing essays and fiction about current social and moral issues.

ENGL 131 Composition: Exposition (5) C Study and practice of good writing; topics derived from a variety of personal, academic, and public subjects.

ENGL 182 The Research Paper (5) C Includes study of library resources, the analysis of reading materials, and writing preparatory papers as basic to writing a reference or research paper. Open to all undergraduates. Prerequisite: one of 111, 121, 131, or equivalent.

ENGL 197 Interdisciplinary Writing/Humanities (5, max. 15) C Expository writing based on material presented in a specified humanities lecture course. Assignments include drafts of papers to be submitted in the specified course, and other pieces of analytical prose. Concurrent registration in the specified course required.

ENGL 198 Interdisciplinary Writing/Social Science (5, max. 15) C Expository writing based on material presented in a specified social science lecture course. Assignments include drafts of papers to be submitted in the specified course, and other pieces of analytic prose. Concurrent registration in specified course required.

ENGL 199 Interdisciplinary Writing/Natural Science (5, max. 15) C Expository writing based on material presented in a specific natural science lecture course. Assignments include drafts of papers to be submitted in the specified course, and other pieces of analytical prose. Concurrent registration in the specified course required.

ENGL 200 Reading Literature (5) VLP Techniques and practice in reading and enjoying literature. Examines some of the best works in English and American literature and considers such features of literary meaning as imagery, characterization, narration, and

patterning in sound and sense. Emphasis on literature as a source of pleasure and knowledge about human experience.

ENGL 205 Method, Imagination, and Inquiry (5) VLPA Examines ideas of method and imagination in a variety of texts, in literature, philosophy, and science. Particularly concerned with intellectual backgrounds and methods of inquiry that have shaped modern Western literature. Offered: jointly with CHID 205.

ENGL 207 Introduction to Cultural Studies (5) VLPA Asks three questions. What is Cultural Studies? How does one read from a Cultural Studies perspective? What is the value of reading this way? Provides historical understanding of Cultural Studies, its terms and its specific way of interpreting a variety of texts, i.e. literature, visual images, music, video, and performance.

ENGL 210 Literature and the Ancient World (5) VLPA Introduction to literature from a broadly cultural point of view, focusing on major works that have shaped the development of literary and intellectual traditions to the Middle Ages.

ENGL 211 Medieval and Renaissance Literature (5) VLPA Introduction to literature from a broadly cultural point of view, focusing on major works that have shaped the development of literary and intellectual traditions from the Middle Ages to the eighteenth century.

ENGL 212 Literature of Enlightenment and Revolution (5) VLPA Introduction to eighteenth- and nineteenth-century literature from a broadly cultural point of view, focusing on representative works that illustrate literary and intellectual developments of the period.

ENGL 213 Modern and Postmodern Literature (5) VLPA Introduction to twentieth-century literature from a broadly cultural point of view, focusing on representative works that illustrate literary and intellectual developments since 1900.

ENGL 225 Shakespeare (5) VLPA Survey of Shakespeare's career as dramatist. Study of representative comedies, tragedies, romances, and history plays.

ENGL 228 English Literary Culture: To 1600 (5) VLPA British literature from Middle Ages to end of sixteenth century. Study of literature in its cultural context, with attention to changes in language, form, content, and style.

ENGL 229 English Literary Culture: 1600-1800 (5) VLPA British literature in seventeenth and eighteenth centuries. Study of literature in its cultural context, with attention to changes in form, content, and style.

ENGL 230 English Literary Culture: After 1800 (5) VLPA British literature in the nineteenth and twentieth centuries. Study of literature in its cultural context, with attention to changes in form, content, and style.

ENGL 242 Reading Fiction (5) VLPA Critical interpretation and meaning in fiction. Different examples of fiction representing a variety of types from the medieval to modern periods.

ENGL 243 Reading Poetry (5) VLPA Critical interpretation and meaning in poems. Different examples of poetry representing a variety of types from the medieval to modern periods.

ENGL 244 Reading Drama (5) VLPA Critical interpretation and meaning in plays. Different examples of drama representing a variety of types from the medieval to modern periods.

ENGL 250 Introduction to American Literature (5) VLPA Survey of the major writers, modes, and themes in American literature, from the beginnings to the present. Specific readings vary, but often included are: Taylor, Edwards, Franklin, Poe, Hawthorne, Melville, Emerson, Thoreau, Whitman, Dickinson,

Twain, James, Eliot, Stevens, O'Neill, Faulkner, Hemingway, Ellison, and Bellow.

ENGL 251 Introduction to American Political Culture (5) VLPA/IS Introduction to the methods and theories used in the analysis of American culture. Emphasizes an interdisciplinary approach to American literature, including history, politics, anthropology, and mass media. Offered: jointly with POL S 281.

ENGL 258 African American Literature: 1745 to Present (5) VLPA A chronological survey of Afro-American literature in all genres from its beginnings to the present day. Emphasizes Afro-American writing as a literary art; the cultural and historical context of Afro-American literary expression and the aesthetic criteria of Afro-American literature. Offered: jointly with AFRAM 214.

ENGL 264 Literature and Science (5) VLPA Explores the relationships between literature and science as ways of comprehending humanity's interaction with the world we inhabit. As a course in criticism, explores how literature and science structure and are structured by social, religious, political, and economic factors in culture.

ENGL 270 Cultural Issues in English (5) VLPA Survey of the assumptions, methodologies, and major issues of English in its cultural settings. Designed to connect English Language study with the study of literature, orality and literacy, education, ethnicity, gender, and public policy.

ENGL 281 Intermediate Expository Writing (5) C Writing papers communicating information and opinion to develop accurate, competent, and effective expression.

ENGL 283 Beginning Verse Writing (5) VLPA Intensive study of the ways and means of making a poem.

ENGL 284 Beginning Short Story Writing (5) VLPA Introduction to the theory and practice of writing the short story.

ENGL 300 Reading Major Texts (5) VLPA Intensive examination of one or a few major works of literature. Classroom work to develop skills of careful and critical reading. Book selection varies, but reading consists of major works by important authors and of selected supplementary materials.

ENGL 302 Critical Practice (5) VLPA Exercise in interpretive practices: a consideration of their powers and limits. Survey of the varieties of critical and interpretive practice from the earliest interpreters of scripture and myth to present-day critics.

ENGL 303 History of Literary Criticism and Theory I (5) VLPA Literary criticism and theory from its beginnings in Plato through the early twentieth century. Philosophical and theoretical grounds for critical practice put forward by philosophers and critics.

ENGL 304 History of Literary Criticism and Theory II (5) VLPA Contemporary criticism and theory and its background in the New Criticism, structuralism, and phenomenology.

ENGL 305 Theories of Imagination (5) VLPA/IS Survey of theories of imagination since the seventeenth century. Focuses on the uses of the concept in literature, criticism, science, and society.

ENGL 307 Cultural Studies: Literature and the Age (5) VLPA Problems of literary periodization. Works by major and minor authors in the context of cultural history; critical and theoretical approaches that have led to the idea of periodization. Emphasis varies. Recommended: 300-level English course in the literary period being studied.

ENGL 310 The Bible as Literature (5) VLPA Introduction to the development of the religious ideas and institutions of ancient Israel, with selected read-

ings from the Old Testament and New Testament. Emphasis on reading *The Bible* with literary and historical understanding.

ENGL 311 Modern Jewish Literature in Translation (5) VLPA Survey of Jewish experience and its literary expression since 1880. Includes such Yiddish writers as Sholom Aleichem, Peretz, and I. B. Singer; such Israeli writers as Agnon, Hazaz, and Appelfeld; and such writers in non-Jewish languages as Primo Levi and Kafka.

ENGL 313 Modern European Literature in Translation (5) VLPA Fiction, poetry, and drama from the development of modernism to the present. Works by such writers as Mann, Proust, Kafka, Gide, Hesse, Rilke, Brecht, Sartre, and Camus.

ENGL 315 Literary Modernism (5) VLPA Various modern authors, from Wordsworth to the present, in relation to such major thinkers as Kant, Hegel, Darwin, Marx, Nietzsche, Bergson, and Wittgenstein, who have helped create the context and the content of modern literature. Recommended: 305 or other 300-level course in nineteenth- or twentieth-century literature.

ENGL 317 Literature of the Americas (5) VLPA Examines writings by and about people of the Americas, with a focus on intersections of gender, colonialism, race, sexuality, and ethnicity.

ENGL 320 English Literature: The Middle Ages (5) VLPA Literary culture of Middle Ages in England, as seen in selected works from earlier and later periods, ages of Beowulf and of Geoffrey Chaucer. Read in translation, except for a few later works, which are read in Middle English.

ENGL 321 Chaucer (5) VLPA Chaucer's *Canterbury Tales* and other poetry, with attention to Chaucer's social, historical, and intellectual milieu.

ENGL 322 English Literature: The Age of Queen Elizabeth (5) VLPA The golden age of English poetry, with poems by Shakespeare, Spenser, Sidney, and others; drama by Marlowe and other early rivals to Shakespeare; prose by Sir Thomas More and the great Elizabethan translators.

ENGL 323 Shakespeare to 1603 (5) VLPA Shakespeare's career as dramatist before 1603 (including *Hamlet*). Study of history plays, comedies, and tragedies.

ENGL 324 Shakespeare After 1603 (5) VLPA Shakespeare's career as dramatist after 1603. Study of comedies, tragedies, and romances.

ENGL 325 English Literature: The Late Renaissance (5) VLPA A period of skepticism for some, faith for others, but intellectual upheaval generally. Poems by John Donne and the "metaphysical" school; poems and plays by Ben Jonson and other late rivals to Shakespeare; prose by Sir Francis Bacon and other writers.

ENGL 326 Milton (5) VLPA Milton's early poems and the prose: *Paradise Lost*, *Paradise Regained*, and *Samson Agonistes*, with attention to the religious, intellectual, and literary contexts.

ENGL 327 English Literature: Restoration and Early Eighteenth Century (5) VLPA Selections from wits and satirists; poems by John Dryden and Alexander Pope; plays by Dryden, William Congreve, and other wits; the great satires of Jonathan Swift, and the first stirring of the novel.

ENGL 328 English Literature: Later Eighteenth Century (5) VLPA Classic age of English prose. Essays, biography, and criticism by Samuel Johnson, Oliver Goldsmith, and others; comedies by Goldsmith and Richard Brinsley Sheridan; fiction by Henry Fielding and others; poetry by a variety of writers.

ENGL 329 Rise of the English Novel (5) VLPA Study of the development of this major and popular

modern literary form in the eighteenth century. Readings of the best of the novelists who founded the form, and some minor ones, from Defoe to Fielding, Richardson, and Sterne, early Austen, and the gothic and other writers.

ENGL 330 English Literature: The Romantic Age (5) VLPA Literary, intellectual, and historical ferment of the period from the French Revolution to the 1830s. Readings from major authors in different literary forms; discussions of critical and philosophical issues in a time of change.

ENGL 331 Romantic Poetry I (5) VLPA Blake, Wordsworth, Coleridge, and their contemporaries.

ENGL 332 Romantic Poetry II (5) VLPA Byron, Shelley, Keats, and their contemporaries.

ENGL 333 English Novel: Early and Middle Nineteenth Century (5) VLPA Studies in the novel in one of its classic phases. Authors include Austen, the Brontës, Dickens, Thackeray.

ENGL 334 English Novel: Later Nineteenth Century (5) VLPA Studies in the novel as it passes from a classic format to formats more experimental. Authors include George Eliot, Thomas Hardy, Joseph Conrad, and others.

ENGL 335 English Literature: The Age of Victoria (5) VLPA Literature in an era of revolution that also sought continuity, when culture faced redefinition as mass culture and found in the process new demands and creative energies, new material and forms, and transformations of old ones. Readings range from works of Tennyson, Browning, Arnold, Shaw, to Dickens, Eliot, Hardy.

ENGL 336 English Literature: The Early Modern Period (5) VLPA Experiments in fiction and poetry. Novels by Joyce, Woolf, Lawrence, and others; poetry by Eliot and Yeats and others.

ENGL 337 The Modern Novel (5) VLPA The novel on both sides of the Atlantic in the first half of the twentieth century. Includes such writers as Joyce, Woolf, Lawrence, Stein, Hemingway, Faulkner, and others.

ENGL 338 Modern Poetry (5) VLPA Poetry in the modernist mode, including such poets as Yeats, Eliot, Pound, Auden, and Moore.

ENGL 339 English Literature: Contemporary England (5) VLPA Return to more traditional forms in such writers as Bowen, Orwell, Waugh, Caryl Phillips, Leavis, and others.

ENGL 340 Modern Anglo-Irish Literature (5) VLPA Principal writers in English of the modern Irish literary movement—Yeats, Joyce, Synge, Gregory, and O'Casey among them—with attention to traditions of Irish culture and history.

ENGL 342 Contemporary Novel (5) VLPA Recent efforts to change the shape and direction of the novel by such writers as Murdoch, Barth, Hawkes, Fowles, and Atwood.

ENGL 343 Contemporary Poetry (5) VLPA Recent developments by such poets as Hughes, Heaney, Rich, Kinnell, and Hugo.

ENGL 344 Twentieth-Century Dramatic Literature (5) VLPA Modern and contemporary plays by such writers as Shaw, Synge, O'Casey, O'Neill, Yeats, Eliot, Beckett, Pinter, and Albee.

ENGL 345 Studies in Film (5) VLPA Types, techniques, and issues explored by filmmakers. Emphasis on narrative, image, and point of view.

ENGL 346 Studies in Short Fiction (5) VLPA The American and English short story, with attention to the influence of writers of other cultures. Aspects of the short story that distinguish it, in style and purpose, from longer fiction.

ENGL 347 The Art of Prose (5) VLPA Techniques and varieties of prose—autobiography, biography, personal essay, reflective and meditative writing, social and scientific inquiry, and persuasive writing. Special attention to use of poetic, fictional, and dramatic devices. Recommended: introductory literature course.

ENGL 348 Studies in Drama (5) VLPA Investigation of one of the major types of drama: tragedy or comedy. Emphasis on drama prior to the twentieth century.

ENGL 349 Fantasy (5) VLPA Nonnaturalistic literature, selected folktales, fairytales, fables, nonsense, ghost stories, horror stories, science fiction, and utopian literature—the supernatural and surreal, the grotesque, the fantastical. Readings and emphasis vary.

ENGL 350 Traditions in American Fiction (5) VLPA A literary form in which America has found its distinctively American expression. Selected readings among important novelists from the beginnings until 1900, including Cooper, Hawthorne, Melville, Twain, Chopin, James, and Wharton.

ENGL 351 American Literature: The Colonial Period (5) VLPA Responses to the New World and literary strategies in the literature of the colonies and the early republic. Works by Taylor, Edwards, Franklin, and others.

ENGL 352 American Literature: The Early Nation (5) VLPA Conflicting visions of the national destiny and the individual identity in the early years of America's nationhood. Works by Emerson, Thoreau, Hawthorne, Melville, and such other writers as Poe, Cooper, Irving, Whitman, Dickinson, and Douglass.

ENGL 353 American Literature: Later Nineteenth Century (5) VLPA Literary responses to an America propelled forward by accelerating and complex forces. Works by Twain, James, and such other writers as Whitman, Dickinson, Adams, Wharton, Howells, Crane, Dreiser, DuBois, and Chopin.

ENGL 354 American Literature: The Early Modern Period (5) VLPA Literary responses to the disillusionment after World War I, experiments in form and in new ideas of a new period. Works by such writers as Anderson, Toomer, Cather, O'Neill, Frost, Pound, Eliot, Cummings, Hemingway, Fitzgerald, Faulkner, Stein, Hart Crane, Stevens, and Porter.

ENGL 355 American Literature: Contemporary America (5) VLPA Works by such writers as Ellison, Williams, O'Connor, Lowell, Barth, Rich, and Hawkes.

ENGL 356 Classic American Poetry (5) VLPA Poetry by Taylor, Whitman, Dickinson, and such others as Poe, Bradstreet, Crane, Robinson. The lineage and characteristics of lyric and epic in America.

ENGL 358 Literature of Black Americans (5) VLPA Selected writings, novels, short stories, plays, poems by Afro-American writers. Study of the historical and cultural context within which they evolved. Differences between Afro-American writers and writers of the European-American tradition. Emphasis varies. Offered: jointly with AFRAM 358.

ENGL 359 Contemporary American Indian Literature (5) VLPA Creative writings—novels, short stories, poems—of contemporary Indian authors; traditions out of which they evolved. Differences between Indian writers and writers of the dominant European/American mainstream. Offered: jointly with AIS 377.

ENGL 360 American Political Culture: To 1865 (5) VLPA/IS American literature in its political and cultural context from the Puritan origins to the Civil War. Emphasizes an interdisciplinary approach to American literature, including history, politics, anthropology, and mass media. Prerequisite: 251.

ENGL 361 American Political Culture: After 1865 (5) VLPA/IS American literature in its political and

cultural context from the Civil War to the present. Emphasizes an interdisciplinary approach to American literature, including history, politics, anthropology, and mass media. Prerequisite: 251.

ENGL 363 Literature and the Other Arts and Disciplines (5, max. 10) VLPA Relationships between literature and other arts, such as painting, photography, architecture, and music, or between literature and other disciplines, such as science. Content varies.

ENGL 364 Literature and Medicine (5) VLPA/IS How changing concepts of doctor-patient relationship and of body depicted in literary texts affect decisions throughout the human life cycle. Medicine and disease as metaphors for personal experience and social analysis.

ENGL 367 Women and the Literary Imagination (5, max. 15) VLPA Study of women writers or ways various writers have portrayed woman's image, social role, and psychology.

ENGL 368 Women Writers (5, max. 15) VLPA Study of the work of women writers in English and American literature.

ENGL 370 English Language Study (5) VLPA Wide-range introduction to the study of written and spoken English. The nature of language; ways of describing language; the use of language study as an approach to English literature and the teaching of English.

ENGL 371 English Syntax (5) VLPA Description of sentence, phrase, and word structures in present-day English. Prerequisite: 370 or LING 200 or equivalent.

ENGL 372 Language Variation in Current English (5) VLPA Examination of geographical, social, and occupational varieties of American English. Relationship between societal attitudes and language use.

ENGL 373 History of the English Language (5) VLPA Evolution of English sounds, forms, structures, and word meanings from Anglo-Saxon times to the present. Prerequisite: 370 or LING 200 or equivalent.

ENGL 374 The Language of Literature (5) VLPA Roles of explicitly describable language features in the understanding and appreciation of various verbal forms. Emphasis on literature, but attention also may be given to nonliterary prose and oral forms.

ENGL 381 Advanced Expository Writing (5) VLPA Concentration on the development of prose style for experienced writers. Recommended: sophomore standing.

ENGL 383 Intermediate Verse Writing (5, max. 10) VLPA Intensive study of the ways and means of making a poem. Further development of fundamental skills. Emphasis on revision. Recommended: 283.

ENGL 384 Intermediate Short Story Writing (5, max. 10) VLPA Exploring and developing continuity in the elements of fiction writing. Methods of extending and sustaining plot, setting, character, point of view, and tone. Recommended: 284.

ENGL 407 Special Topics in Cultural Studies (5) VLPA Advanced work in Cultural Studies.

ENGL 411 Introduction to the Folktale Among Literate Peoples (3) VLPA Techniques of classification, geographic-historical distribution, theories of origin and interpretations, and related areas of investigation of the oral prose folk narrative of literate peoples.

ENGL 422 Arthurian Legends (5) VLPA Medieval romance in its cultural and historical setting, with concentration on the evolution of Arthurian romance.

ENGL 430 British Writers: Studies in Major Authors (5, max. 15) VLPA Concentration on one writer or a special group of British writers.

ENGL 431 Topics in British Literature (5, max. 15) VLPA Themes and topics of special meaning to British literature.

ENGL 440 Special Studies in Literature (3/5, max. 10) VLPA Themes and topics offering special approaches to literature.

ENGL 442 The Novel: Special Studies (5, max. 10) VLPA Readings may be English or American and drawn from different periods, or they may concentrate on different types—gothic, experimental, novel of consciousness, realistic novel. Special attention to the novel as a distinct literary form. Specific topic varies from quarter to quarter.

ENGL 443 Poetry: Special Studies (5, max. 10) VLPA A poetic tradition or group of poems connected by subject matter or poetic technique. Specific topics vary, but might include poetry as a geography of mind, the development of the love lyric, the comic poem.

ENGL 444 Dramatic Literature: Special Studies (5, max. 10) VLPA Study of a particular dramatic tradition (such as expressionism or the absurd theatre) or character (the clown) or technique (play-within-a-play, the neoclassical three unities). Topics vary.

ENGL 451 American Writers: Studies in Major Authors (5, max. 15) VLPA Concentration on one writer or a special group of American writers.

ENGL 452 Topics in American Literature (5, max. 15) VLPA Exploration of a theme or special topic in American literary expression.

ENGL 453 Introduction to American Folklore (5) VLPA Study of different kinds of folklore inherited from America's past and to be found in America today.

ENGL 457 Pacific Northwest Literature (5) VLPA Concentrates in alternate years on either prose or poetry of the Pacific Northwest. Prose works examine early exploration, conflicts of native and settlement cultures, various social and economic conflicts. Pacific Northwest poetry includes consideration of its sources, formative influences, and emergence into national prominence.

ENGL 466 Gay and Lesbian Studies (5) VLPA/I&S Examination of ways gays and lesbians are represented in literature, film, performance, and popular culture and how these representations are interpreted in mainstream, gay/lesbian, and academic writing.

ENGL 470 Literature, Literary Study, and Society (5) VLPA/I&S Relationship of literature to society with particular emphasis on literary education. What social values determine the educational importance of literature, what segments of society are trained to read and to write literature, and how literature is institutionalized as part of pedagogical methodology. Emphasis varies.

ENGL 471 The Composition Process (5) VLPA Consideration of psychological and formal elements basic to writing and related forms of nonverbal expression and the critical principles that apply to evaluation.

ENGL 472 Language Learning (5) VLPA Consideration of how an individual achieves psychological and esthetic grasp of reality through language; relates language development to reading skills, literary interpretation, grammar acquisition, oral fluency, discursive and imaginative writing.

ENGL 473 Current Developments in English Studies: Conference (5) VLPA

ENGL 474 Special Topics in English for Teachers (1-10) VLPA

ENGL 475 Colloquium in English for Teachers (1-5, max. 10) VLPA

ENGL 476 Puget Sound Writing Program Institute (1-9) VLPA Focus on the writing process and the teaching of writing, accomplished through research,

writing, reflection, and demonstration of writing instruction. Affiliated with the National Writing Project. Prerequisite: teaching certification and permission of instructor.

ENGL 477 Children's Literature (5) VLPA An examination of books that form a part of the imaginative experience of children, as well as a part of a larger literary heritage, viewed in the light of their social, psychological, political, and moral implications.

ENGL 478 Language and Social Policy (5) VLPA/I&S Examines the relationship between language policy and social organization; the impact of language policy on immigration, education, and access to resources and political institutions; language policy and revolutionary change; language rights.

ENGL 479 Language Variation and Language Policy in North America (5) VLPA/I&S Surveys basic issues of language variation: phonological, syntactic, semantic, and narrative/discourse differences among speech communities of North American English; examines how language policy can affect access to education, the labor force, and political institutions.

ENGL 481 Special Studies in Expository Writing (5) VLPA Individual projects in various types of non-fictional prose, such as biographical sketches, informational reports, literary reviews, and essays. Recommended: sophomore standing.

ENGL 483 Advanced Verse Writing (5, max. 15) VLPA Intensive study of ways and means of making a poem. Recommended: 383.

ENGL 484 Advanced Short Story Writing (5, max. 10) VLPA Experience with the theory and practice of writing the short story. Recommended: 384.

ENGL 485 Novel Writing (5, max. 15) VLPA Experience in planning, writing, and revising a work of long fiction, whether from the outset, in progress, or in already completed draft.

ENGL 486 Playwriting (5, max. 10) VLPA Experience in planning, writing, and revising a play, whether from the outset, in progress, or in already completed draft.

ENGL 487 Screenwriting (5) VLPA Students read screenwriting manuals and screenplays, analyze exemplary films, and write synopses, treatments, and first acts of their own screenplays.

ENGL 490 Study Abroad Program (5) VLPA This course, for students in the Study Abroad program, relates major works of literature to the landscape and activities of its setting.

ENGL 491 Internship (1-6, max. 12) Supervised experience in local businesses and other agencies. Open only to upper-division English majors. Credit/no credit only. Prerequisite: 25 credits in English.

ENGL 492 Advanced Expository Writing Conference (3-5, max. 10) Tutorial arranged by prior mutual agreement between individual student and instructor. Revision of manuscripts is emphasized, but new work may also be undertaken. Prerequisite: permission of program director.

ENGL 493 Advanced Creative Writing Conference (3-5, max. 10) Tutorial arranged by prior mutual agreement between individual student and instructor. Revision of manuscripts is emphasized, but new work may also be undertaken. Prerequisite: permission of program director.

ENGL 494 Honors Seminar (5) VLPA Survey of current issues confronting literary critics today. Readings begin with work in the New Criticism that followed World War II and move forward to consider issues such as changing student population and role of the critic, revisions of the past, emergent technologies, and rise of interdisciplinary teaching and research.

ENGL 495 Major Conference for Honors in Creative Writing (5) Special projects available to honors students in creative writing. Required of, and limited to, honors students in creative writing.

ENGL 496 Major Conference for Honors (5) Individual study (reading, papers) by arrangement with the instructor. Required of, and limited to, honors seniors in English.

ENGL 497 Honors Senior Seminar (5) VLPA Seminar study of special topics in language and literary study. Limited to honors students majoring in English.

ENGL 498 Senior Seminar (5) VLPA Seminar study of special topics in language and literary study. Limited to seniors majoring in English.

ENGL 499 Independent Study (3-5, max. 10) Individual study by arrangement with instructor. Prerequisite: permission of director of undergraduate education.

Courses for Graduates Only

ENGL 500 Reading Medieval Literature (5) Special problems involved in the study and interpretation of medieval texts, selected examples drawn from the beginnings of English literature to 1500.

ENGL 501 The Renaissance and Literary Tradition (5) Examination of selected texts from 1500 to 1660, concentrating on specific problems of interpretation and scholarship characteristic of the study of works written during the Renaissance.

ENGL 502 English Literary Culture: 1660-1800 (5) Examination of selected texts of the Restoration and eighteenth century, concentrating on specific problems of interpretation and scholarship characteristic of the study of works written during the period.

ENGL 503 English Literary Culture: 1800-1900 (5) Examination of selected texts from the nineteenth century, concentrating on specific problems of interpretation and scholarship characteristic of the study of works written during the period.

ENGL 504 Backgrounds of Modern Literature (5) Examination of selected texts from the twentieth century, concentrating on specific problems of interpretation and scholarship characteristic of the study of works written during the period.

ENGL 505 Theories of American Literature (5) Examination of selected texts in American Literature, concentrating on the specific problems of interpretation and scholarship characteristic of the study of works in this field.

ENGL 506 Critical Approaches to Literary Texts (5) Examination of a range of critical theories and practices appropriate to the study of literature.

ENGL 507 History of Literary Criticism and Theory I (5, max. 15) A general introduction to the major issues in the history of criticism followed by the study of the classical theorists, including Plato, Aristotle, Longinus, and the major medieval critics. Offered: jointly with C LIT 507.

ENGL 508 History of Literary Criticism and Theory II (5, max. 15) Literary criticism and theory from the Middle Ages and the Renaissance through the eighteenth century to, but not including, Kant. Offered: jointly with C LIT 508.

ENGL 509 History of Literary Criticism and Theory III (5, max. 15) Literary criticism and theory from Kant's Critique of Judgment to the mid-twentieth century and the work of Northrop Frye. Offered: jointly with C LIT 509.

ENGL 510 History of Literary Criticism and Theory IV (5, max. 15) A study of the major issues in literary criticism and theory since about 1965. Offered: jointly with C LIT 510.

- ENGL 512** Introductory Reading in Old English (5)
- ENGL 513** Old English Language and Literature (5, max. 15)
- ENGL 514** Middle English (5, max. 15)
- ENGL 515** Chaucer (5, max. 15)
- ENGL 516** Topics in Medieval English Literature (5, max. 15)
- ENGL 517** Sixteenth-Century Literature (5, max. 15)
- ENGL 518** Shakespeare (5, max. 15)
- ENGL 520** Seventeenth-Century Literature (5, max. 15)
- ENGL 521** Milton (5, max. 15)
- ENGL 522** Topics in the English Renaissance, 1485-1660 (5, max. 15)
- ENGL 524** Restoration and Eighteenth-Century Literature (5, max. 15)
- ENGL 525** Topics in Restoration and Eighteenth-Century Studies (5, max. 15)
- ENGL 527** Romanticism (5, max. 15)
- ENGL 528** Victorian Literature (5, max. 15)
- ENGL 529** Topics in Nineteenth-Century Studies (5, max. 15)
- ENGL 531** Early American Literature (5, max. 15)
- ENGL 532** Nineteenth-Century American Literature (5, max. 15)
- ENGL 533** Modern American Literature (5, max. 15)
- ENGL 535** American Culture and Criticism (5, max. 15)
- ENGL 537** Topics in American Studies (5, max. 15)
- ENGL 540** Modern Literature (5, max. 15)
- ENGL 541** Contemporary Literature (5, max. 15)
- ENGL 543** Anglo-Irish Literature (5, max. 15)
- ENGL 544** World Literature in English (5, max. 15)
- ENGL 546** Topics in Twentieth-Century Literature (5, max. 15)
- ENGL 550** Studies in Narrative (5, max. 15)
- ENGL 551** Studies in Poetry (5, max. 15)
- ENGL 552** Studies in Drama (5, max. 15)
- ENGL 554** Theories of Structure, Genre, Form, and Function (5, max. 15)
- ENGL 555** Feminist Theories (5, max. 15)
- ENGL 556** Cultural Studies (5, max. 15)
- ENGL 559** Literature and Other Disciplines (5, max. 15)
- ENGL 560** The Nature of Language: History and Theory (5)
- ENGL 561** Stylistics (5)
- ENGL 562** Discourse Analysis (5)
- ENGL 563** Comparative Grammars (5)
- ENGL 564** Current Rhetorical Theory (5) Prerequisite: teaching experience.
- ENGL 567** Approaches to Teaching Composition (1-5, max. 10) Readings in composition theory and

discussion of practical classroom applications. Prerequisite: previous experience or concurrent assignment in teaching writing.

ENGL 569 Topics in Language and Rhetoric (5, max. 15)

ENGL 570 Practicum in Teaching English as a Second Language (3, max. 6) Discussion and practice of second-language teaching techniques. Three hours per week teaching required in addition to regular class meetings. Credit/no credit only. Prerequisite: 571 or permission of instructor.

ENGL 571 Theory and Practice on Teaching English to Speakers of Other Languages (5) Topics include second language reading, aural/oral skills, critical pedagogy, program administration, and language policy.

ENGL 572 Methods and Materials for Teaching English as a Second Language (5) Prerequisite: LING 445 or permission of instructor.

ENGL 574 Research Methods in Second-Language Acquisition (5) Prerequisite: 572, LING 449, or permission of instructor.

ENGL 575 Pedagogy and Grammar in Teaching English as a Second Language (5)

ENGL 576 Testing and Evaluation in English as a Second Language (5) Evaluation and testing of English language proficiency, including testing theory, types of tests, and teacher-prepared classroom tests. Prerequisites: 571 and 572 or permission of instructor.

ENGL 578 Colloquium in Teaching English to Speakers of Other Languages (5, max. 10) Overview of major issues in second-language acquisition, teaching methodology, and classroom practice with special emphasis on links between theories of language learning and practical aspects of teaching English to speakers of other languages.

ENGL 581 The Creative Writer as Critical Reader (5)

ENGL 584 Advanced Fiction Workshop (5, max. 15) Prerequisite: graduate standing.

ENGL 585 Advanced Poetry Workshop (5, max. 15) Prerequisite: graduate standing.

ENGL 586 Graduate Writing Conference (5)

ENGL 590 Master of Arts Essay (5/10, max. 10) Research and writing project under the close supervision of a faculty member expert and with the consultation of a second faculty reader. The field of study is chosen by the student. Work is independent and varies. The model is an article in a scholarly journal. Prerequisite: graduate standing in English.

ENGL 591 Master of Arts for Teachers Essay (5) Research and writing project under the close supervision of a faculty member expert in the field of study chosen by the student within the MAT degree orientation towards the teaching of English, and with the consultation of a second faculty reader. The model is an article in a scholarly journal.

ENGL 592 Graduate English Studies (1-5, max. 10)

ENGL 593 Textual Criticism (5) Introduction to paleography, codicology, analytical and descriptive bibliography; examination of the major contributions to textual theory in the nineteenth and twentieth centuries; practice in applying textual theory in editing literary works.

ENGL 595 Topics in Teaching Literature (5, max. 15)

ENGL 597 Directed Readings (* max. 18) Intensive reading in literature or criticism, directed by members of doctoral supervisory committee. Credit/no credit only.

ENGL 598 Colloquium in English (1-5, max. 10) Lectures and seminars presented by visiting scholars or a range of local scholars relevant to English graduate studies.

ENGL 599 Special Studies in English (5, max. 15)

ENGL 600 Independent Study or Research (*)

ENGL 601 Internship (3-9, max. 9) Credit/no credit only.

ENGL 700 Master's Thesis (*)

ENGL 800 Doctoral Dissertation (*)

European Studies

See International Studies

General Studies

9 Communications

A General Studies major is a special interdisciplinary major designed by an individual student.

Undergraduate Program

Bachelor of Arts, Bachelor of Science

Admission Requirements: A written statement including the theme of the major, a brief essay describing the major, and a proposed course list. (Guidelines are available at the General Studies office.) Approval of two faculty supervisors and the General Studies committee. Prospective majors should submit proposals to the General Studies committee for review at least three quarters prior to graduation.

Major Requirements: Completion of the approved curriculum and a 5-credit required senior study (minimum 2.7 grade required for senior study). Awarding of the Bachelor of Arts or Bachelor of Science degree depends on the content of each student's program.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

GEN ST 101 University Learning Skills (2-3) Introduction to university culture. Practice in skills necessary for academic success, including note-taking, test-taking, writing, active learning, and time and stress management. Academic planning. Introduction to university resources.

GEN ST 110 Introduction to the Environment (5) I&S/NW Natural history and human modifications of the natural world. Evolutionary biology, physical geography, toxicology, energy, economics, law, public policy. Offered: ASP.

GEN ST 197 Freshman Seminar (1 max. 3) Small-group discussion with faculty representing a wide spectrum of academic disciplines. Topics and approaches vary. Instructor may introduce research techniques or findings, concentrate on readings in his/her area of interest, or illustrate problems and alternatives related to the study of a particular academic discipline. Credit/no credit only. Offered: AWSp.

GEN ST 199 University Resources, Information, and Technology (1-2) Introduces Freshman Interest Group participants to University resources, information

retrieval and dissemination, and academically related technology. Credit/no credit only. Offered: A.

GEN ST 350 Independent Fieldwork (1-6 max. 18) Independent fieldwork in community agencies, apprenticeships, internships, as approved for College of Arts and Sciences credit. Faculty supervisor is required. Credit/no credit only. Prerequisites: permission of faculty supervisor and General Studies adviser. Offered: AWSpS.

GEN ST 391 Supervised Study in Selected Fields (* max. 15) Special supervised study in a field represented in the College of Arts and Sciences. Prerequisites: permission of faculty supervisor and General Studies adviser. Credit/no credit only. Offered: AWSpS.

GEN ST 470 Peer Advising (2-3 max. 12) Provides instruction in group leadership and promotion of values and methods of learning within a liberal arts setting. For peer advisers in the Freshman Interest Group Program. Credit/no credit only. Offered: AWSpS.

GEN ST 480 Senior Seminar: Humanities (5) Seminar examining the relationships and parallels in languages, literature, and culture. Each student required to complete a project or research paper on a topic appropriate to a humanities track. Prerequisites: senior standing, General Studies Humanities major (Evening Degree program).

GEN ST 481 Senior Seminar: Social Sciences (5) Historic and contemporary issues related to tracks considered. Each student required to complete a project or research paper on a topic appropriate to the major track. Prerequisites: senior standing, General Studies Social Science major (Evening Degree Program).

GEN ST 493 Senior Study (5) For General Studies majors only. Prerequisites: permission of faculty supervisor and General Studies adviser. Offered: AWSpS.

Genetics

J205 Health Sciences

An undergraduate degree is not offered. Students who desire an undergraduate curriculum emphasizing subject matter in genetics are advised to refer to the cellular and molecular biology listing under Biology.

Graduate Program

Colin C. Manoil, Graduate Program Coordinator

The Department of Genetics offers graduate programs leading to the degrees of Master of Science and Doctor of Philosophy. A student may choose among a wide variety of research areas, while, at the same time, receiving broad training in genetics. New graduate students join a research project in one of the faculty laboratories during each of the first three quarters in residence. New students thereby become acquainted with several different experimental approaches in research in genetics, and the projects help them choose an adviser for their thesis work at the end of the first year. In addition to graduate courses offered by the Department of Genetics, students can choose among a large number of courses in related departments to broaden their perspective. Graduate students also participate in undergraduate teaching after gaining expertise in pertinent areas. A General Examination is taken during the second year to gain formal admittance to candidacy for the Ph.D. degree.

Applications for graduate work are invited from students who have emphasized biology, the physical sciences, or mathematics in their undergraduate careers. Applicants are asked to submit Graduate

Record Examination scores and three letters of recommendation.

Financial Aid

The Department of Genetics offers financial support to promising students who wish to work toward the doctoral degree.

Research Facilities

The department is housed in a modern, well-equipped building shared with the Department of Biochemistry and the Howard Hughes Medical Institute. Students benefit from interdisciplinary research and teaching programs in collaboration with departments having related interests.

Correspondence and Information

Graduate Program Coordinator
J205 Biochemistry-Genetics, Box 357360

Faculty

Chair

Breck E. Byers

Professors

Bendich, Arnold J. * 1970, (Adjunct); PhD, 1969, University of Washington; mitochondrial and chloroplast genome structure.

Brewer, Bonita J. * 1982; PhD, 1979, University of Washington; replication of chromosomes, plasmids, and mitochondrial DNA in yeast.

Byers, Breck E. * 1970; PhD, 1967, Harvard University; cell biology; mitosis and meiosis, mechanisms of nuclear division and crossing-over in yeast.

Deeb, Samir S. * 1983, (Adjunct Research); PhD, 1964, University of Illinois; genetic factors predisposing to hyperlipidemia and coronary artery disease.

Elsen, Harvey * 1986, (Affiliate); PhD, 1967, University of Toronto (Canada); host-parasite interactions, generation of genetic diversity.

Fangman, Walton L. * 1967; PhD, 1965, Purdue University; molecular genetics: control of replication of yeast chromosomes, plasmid and mitochondrial DNA.

Felsenstein, Joseph * 1968; PhD, 1968, University of Chicago; evolution and population genetics.

Fields, Stanley 1995; MA, 1978, PhD, 1981, Cambridge University (UK); molecular genetics.

Furlong, Clement E. * 1977, (Research); PhD, 1968, University of California (Davis); human biochemical genetics in biochemistry of membrane transport systems.

Gallant, Jonathan A. * 1961; PhD, 1961, Johns Hopkins University; molecular genetics, control mechanisms in bacteria, accuracy of translation.

Gartler, Stanley M. * 1957, (Emeritus); PhD, 1952, University of California (Berkeley); mammalian somatic cell genetics with emphasis on the mechanism of x-chromosome inactivation.

Hall, Benjamin D. * 1983; MA, 1956, PhD, 1959, Harvard University; molecular genetics and evolution of plants and lower eukaryotes.

Hartwell, Leland H. * 1968; PhD, 1964, Massachusetts Institute of Technology; genetic analysis of chromosome transmission and of the control of division by hormones in yeast.

Hawthorne, Donald C. * 1980, (Emeritus); PhD, 1955, University of Washington; yeast genetics, chromosome mapping, suppressors.

King, Mary-Claire 1995; PhD, 1973, University of California (Berkeley); human genetics.

Laird, Charles D. * 1971, (Adjunct); PhD, 1966, Stanford University; cell and developmental biology, human genetics.

Martin, George * 1957, (Adjunct); MD, 1953, University of Washington; somatic cell genetics, pathobiology of aging, Alzheimer's disease, Werner's syndrome.

Motulsky, Arno G. * 1953, (Emeritus); MD, 1947, University of Illinois; medical genetics.

Olson, Maynard V. 1992, (Adjunct); PhD, 1970, Stanford University; large-scale genome mapping and sequencing.

Pious, Donald A. * 1964, (Adjunct); MD, 1956, University of Pennsylvania; antigen processing, function of nonclassical MHC genes, MHC gene regulation.

Schubiger, Gerold A. * 1972, (Adjunct); PhD, 1968, University of Zurich (Switzerland); developmental genetic control of *Drosophila* embryos, pattern formation in imaginal disks.

Sibley, Carol Hopkins * 1976; PhD, 1974, University of California (San Francisco); mammalian cell genetics and molecular parasitology.

Smith, Gerald R. * 1983, (Affiliate); PhD, 1970, Massachusetts Institute of Technology; molecular biology of genetic recombination and regulation of gene expression.

Stadler, David R. * 1956, (Emeritus); PhD, 1952, Princeton University; mutation and genetic repair in *Neurospora*.

Stamatoyannopoulos, George 1965; MD, 1958, DMedSc, 1960, University of Athens (Greece); medical genetics.

Trask, Barbara J. * 1992, (Adjunct Research); PhD, 1985, University of Leiden (Netherlands); in situ hybridization, analytical cytogenetics, analysis of large-scale DNA polymorphism.

Young, Elton * 1969, (Adjunct); PhD, 1967, California Institute of Technology; regulation of gene activity in the yeast *Saccharomyces cerevisiae*.

Associate Professors

Braun, Robert Elmer * 1986; PhD, 1985, Tufts University; mouse molecular genetics and male germ cell development.

Manoil, Colin C. * 1986; PhD, 1979, Stanford University; molecular genetics, protein localization in bacteria.

Monnat, Raymond J. Jr. * 1982, (Adjunct); MD, 1976, University of Chicago; somatic mutation, somatic cell and molecular genetics, and human genetic disease.

Reid, Brian J. 1983, (Adjunct); PhD, 1979, MD, 1980, University of Washington; gastroenterology.

Thomas, James H. * 1988; PhD, 1985, Massachusetts Institute of Technology; genetics of development and the nervous system in nematodes.

Wakimoto, Barbara T. * 1984, (Adjunct); PhD, 1981, Indiana University; developmental genetics, gene expression and chromosome organization in eukaryotes.

Assistant Professors

Berg, Celeste A. * 1990; PhD, 1986, Yale University; *drosophila* developmental genetics: cell communication and cell migration during oogenesis.

Ruohola-Baker, Hannele * 1993, (Adjunct); PhD, 1989, Helsinki University (Finland); oogenesis, developmental genetics.

Wright, Robin L. * 1990, (Adjunct); PhD, 1985, Carnegie-Mellon University; membrane dynamics and regulation of sterol biosynthesis in yeast.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

GENET 351 Human Genetics: The Individual and Society (4) NW Principles of Mendelian inheritance as illustrated by human traits and diseases; chromosomes and sex determination; distribution of genes in populations; natural selection and evolution; counseling and genetic engineering; ethical issues. Appropriate for nonscience majors. Offered: ASP.

GENET 371 Introductory Genetics (5) NW Explores gene transmission, chromosome mapping, quantitative traits, population genetics, genetic analysis of biological processes. Emphasizes formal genetic mechanisms but includes some molecular techniques, such as restriction mapping, cloning, RFLP analysis. For biological sciences majors. Prerequisite: CHEM 150. Recommended: BIOL 201. Offered: AWS.

GENET 372 Gene Structure and Function (5) NW Explores the structure of genes and chromosomes, the mechanisms and control of transcription and translation, and the molecular mechanisms of mutation, recombination, transposition, and development. Intended for majors in biological sciences. Prerequisite: 371 or BIOL 201. Offered: WSp.

GENET 411 Gene Action (5) NW Molecular genetics: description of fundamental genetics processes such as mutation, repair, genetic exchange, recombination, and gene expression. Use of genetic strategies to analyze complex biological processes. Focus is on prokaryotic organisms. Prerequisites: 371 or 372 or MICROM 410; CHEM 237. Offered: jointly with MICROM 411; W.

GENET 453 Genetics of the Evolutionary Process (3) NW *Felsenstein* Contributions of genetics to the understanding of evolution. Processes of mutation, selection, and random genetic events as they affect the genetic architecture of natural populations and the process of speciation. Emphasis on experimental data and observation, rather than mathematical theory. Prerequisite: 371 or 372.

GENET 454 The Origins of Genetics (4) NW Discovery and eventual triumph of Mendelism in the early twentieth century. Concepts of heredity from ancient times to the nineteenth century. Mendel's work and its rediscovery. Evidence contributing to cornerstone of classical genetics—the chromosome theory of heredity. Prerequisite: 351 or 371 or 372 or 10 credits in biological sciences. Offered: A.

GENET 455 Molecular Genetics (3) NW The structure of genes and molecular mechanisms of gene expression. First part of the course draws upon information obtained with viruses and bacterial cells and serves as background for a study of eukaryotic cells in the second part. Prerequisites: 371 or 411, CHEM 237, or permission of instructor.

GENET 490 Undergraduate Seminar (1) NW Seminar for advanced undergraduate students engaged in individual research projects or those who wish to gain an understanding of genetic research by analysis of the primary literature. Assignments emphasize the rationale for research projects and the presentation and interpretation of research findings. Offered: AWSpS.

GENET 499 Undergraduate Research (* max. 30) Credit/no credit only. Prerequisite: permission of instructor. Offered: AWSpS.

Courses for Graduates Only

GENET 501 Introduction to Research Materials (3, max. 9) The student undertakes a research project in one of the research groups within the department for a

quarter at a time. Credit/no credit only. Prerequisite: graduate standing in the Department of Genetics or permission of graduate program coordinator. Offered: AWSpS.

GENET 520 Seminar (1, max. 15) Credit/no credit only. Prerequisite: graduate standing in the Department of Genetics or permission of graduate program coordinator. Offered: AWSp.

GENET 525 Current Literature in Human Genetics (1) Topics from current literature in human genetics. Students and faculty each present one topic per quarter. Credit/no credit only. Prerequisite: graduate or postdoctoral status. Offered: AWSp.

GENET 531 Human Genetics (3) *Fields, Hartwell* Modern approaches to the identification of human disease genes permitted by their isolation. Functional conservation of proteins throughout eukaryotic evolution as an approach to their function in model systems such as somatic cell culture, transgenic mice, nematodes, *Drosophila*, and yeast. Prerequisite: second-year graduate student. Offered: alternate years.

GENET 550 Methods and Logic in Genetics (3) Critical reading and detailed discussion of genetics-related scientific research papers. Material emphasizes methodological and logical themes of importance in modern genetics, for example: origin of mutants, genetic epistasis, pulse labelling, and in vivo gene function. Prerequisite: first year genetics graduate students only. Offered: A.

GENET 551 Basics of Genetic Analysis (3) First course in a three-quarter sequence in formal, molecular, and microbial genetics. Offered: A.

GENET 552 Nature and Consequences of Mutation (3) Origin of mutations and their analysis in human and other genomes. Prerequisite: 551 or permission of instructor. Offered: W.

GENET 553 Chromosome Structure and Mechanisms (3) Chromosome structure and DNA replication; molecular basis of recombination and transposition. Prerequisite: 552 or permission of instructor. Offered: Sp.

GENET 554 Topics in Genetics (2, max. 6) Current problems and research methods. Credit/no credit only. Prerequisite: permission of instructor.

GENET 562 Population Genetics (4) *Felsenstein* Mathematical and experimental approaches to the genetics of natural populations, especially as they relate to evolution. Emphasis on theoretical population genetics. Prerequisite: permission of instructor. Offered: Sp.

GENET 564 Molecular Cytogenetics (3) *Byers* Cellular processes of gene transfer in mitosis, meiosis, and gametogenesis, with emphasis on ultrastructure and macromolecular mechanisms. Prerequisite: permission of instructor. Offered: alternate years.

GENET 575 Developmental Genetics (3) Genetic control of early development in a range of organisms, emphasizing systems in which cellular, genetic, and molecular approaches have combined to make significant contributions to understanding. Prerequisite: permission of instructor. Offered: W.

GENET 581 Seminar in *Drosophila* Genetics (1) *erg* Discussions of contemporary research in and novel methods for genetic, cell biological, and molecular biological analysis of *Drosophila* development. Credit/no credit only. Offered: AWSp.

GENET 582 Seminar in Mouse Genetics (1) *Braun* Discussion of contemporary research in and novel methods for genetic, cell biological, and molecular analysis of mammalian development, with utilization of transgenic techniques. Credit/no credit only. Offered: AWSp.

GENET 583 Seminar in Molecular Cytology (1) *Byers* Discussions of contemporary research in and

novel methods for genetic, cell biological, and molecular biological analysis of spindle behavior in the mitotic cell cycle of budding yeast. Credit/no credit. Offered: AWSp.

GENET 584 Seminar in DNA Replication (1) *Brewer, Fangman* Discussions of contemporary research in and novel methods for genetic, cell biological, and molecular biological analysis of budding yeast, with emphasis on the mechanisms and control of DNA replication. Credit/no credit only. Offered: AWSp.

GENET 585 Seminar in Bacterial Genetics (1) *Manoil* Discussions of contemporary research in and novel methods for genetic, cell biological, and molecular biological analysis of bacterial assembly mechanisms, with emphasis on the topogenesis of membrane proteins. Credit/no credit only. Offered: AWSp.

GENET 586 Seminar in Mammalian Genetics (1) *Sibley* Discussions of contemporary research in and novel methods for genetic, cell biological, and molecular biological analysis of mammalian genetics, with emphasis on lymphoblast development. Credit/no credit only. Offered: AWSp.

GENET 587 Seminar in Nematode Genetics (1) *Thomas* Discussions of contemporary research in and novel methods for genetic, cell biological, and molecular biological analysis of nematode development, with emphasis on neurogenesis and other developmental processes. Credit/no credit only. Offered: AWSp.

GENET 590 Population Genetics Seminar (1) *Felsenstein* Weekly presentation by participants of current literature and ongoing research in evolution, molecular evolution, evolutionary genetics of natural populations, human population genetics, and quantitative genetics applied to animal and plant breeding. Credit/no credit only. Prerequisite: 562 or permission of instructor.

GENET 600 Independent Study or Research (*) Credit/no credit only. Offered: AWSpS.

GENET 700 Master's Thesis (*) Offered: AWSpS.

GENET 800 Doctoral Dissertation (*) Offered: AWSpS.

Geography

408A Smith

Geography is a lively discipline providing a distinctive spatial approach to many of today's societal problems and issues: regional inequality, growth of service activities, residential and educational segregation, health-care delivery, urban growth management, transportation efficiency, environmental and pollution problems, economic impacts of major investments or technological changes, spatial efficiency of industrial production, and the activities of international corporations and political states. Geography is the study of how individuals, groups, and societies interact with their environments. Geography seeks to understand the complex processes that result in observed patterns of settlement, location of economic activities, patterns of development, political organization, and the linkages and direction of trade and communication. Geographers also construct analytical tools, models of information representation, and graphic portrayals (notably maps) to aid the cognitive process of understanding.

Individual undergraduate and graduate programs are built around four concentrations and program options. Students are encouraged to develop a specific, individualized focus of study within their chosen concentration.

1. *Urban, social, and political processes and patterns.* Human population distribution, migration, settlement

systems, and organization. Geographic facets of ethnicity, race, and gender; wealth and poverty; and health and disease. Cultural landscapes; politics, nationalism, and identity-formation; geopolitics. Location of urban services, including health-care systems, urban transportation, land use and housing, and neighborhoods. Urban spatial policies. Courses include: 230, 277, 280, 308, 330, 342, 350, 371, 375, 380, 430, 431, 440, 442, 443, 445, 478.

2. Economic geography. Location, spatial-organizational structures, interrelationships between the economy and the environment, and economic interdependencies of industrial and commercial activities. Analysis and implications of resource distribution and use, market areas, and patterns of technological change. Domestic and international trade; land, air, and water transportation networks and systems. Regional and international economic development. Economics of resource use and land use. Related policies, policy conflicts, regulations, and management. Courses include: 207, 230, 302, 330, 336, 349, 350, 366, 370, 371, 430, 433, 435, 440, 443, 447, 448, 449, 450, 478, 498.

3. Regional geography and international development studies. Continental and global patterns of international relations and development. Political economy of development; development theory and practice; globalization. Analysis of geographic concepts in the regional context, especially on such topics as: population growth and migration; development history, theory, and practice; hunger, resources, and poverty; and interconnections in the global economy. Special emphasis on East Asia, Russia and the former Soviet republics, Africa, Latin America, Canada, and the United States. Courses include: 230, 302, 304, 308, 313, 330, 333, 335, 336, 349, 371, 375, 401, 404, 430, 431, 432, 433, 434, 435, 437, 466.

4. Geographic Information Systems (GIS). Role, design, and use of geographic information systems for research and planning. Use of computers in the collection, manipulation, analysis, and presentation of geographically related data. Courses include: 360, 370, 426, 443, 447, 458, 460, 461, 463, 465, 471.

Special Research and Teaching Facilities

A Map Center in Suzzallo Library houses atlases, sheet maps, and aerial photographs. Departmental facilities include the Edward L. Ullman Geography Collaboratory and the John C. Sherman Cartographic Laboratory, which houses a variety of computer workstations connected to the campus computer network. The Department of Geography is a member of the Center for Social Science Computation and Research, which maintains an extensive data archive and offers many statistical and software consulting services.

Undergraduate Program

Advisers
Lucy Jarosz, Richard Roth
Box 353550
email: rroth@u.washington.edu

Bachelor of Arts

Admission Requirements (15 credits): 10 credits in 100- and 200-level geography courses, with no more than one course at the 100 level; 5 lower-division, credits in an adviser-approved environmental processes/earth sciences course (GEOG 205 or equivalent); a minimum grade of 2.0 in each course and a cumulative GPA of 2.50 for the three courses presented for admission.

Major Requirements (60 credits, including 15 for admission requirements): (1) Foundation Courses (10 credits): GEOG 326 (5) or equivalent research methods/statistical analysis course; GEOG 360 (5) or

equivalent; both courses must be completed within two quarters of admission to the major. (2) Tutorial for Majors, GEOG 397 (1 credit): Within two quarters of admission to the major all students must complete the major's tutorial. (3) Concentration (15 credits): three upper-division, 5-credit geography courses, including two at the 400 level. (4) Electives (15 credits): 10 credits must be at the 300 or 400 level. 100-level geography courses may not count toward this requirement. (5) Capstone Experience (4 credits minimum): May include senior essays, seminars, workshop courses, or other arrangements.

Other requirements: (1) Transfer students must complete a minimum of 25 upper-division geography credits in residence at the UW; (2) Minimum grade of 2.0 in each course and minimum cumulative GPA of 2.50 for all geography courses; (3) Students are encouraged to take elective courses outside geography in fields which support their concentration. Consult advisers for lists of appropriate courses. (4) Certificates are offered for students with interests in areas such as location studies or trade and transportation.

Minor

Minor Requirements: 30 credits in geography, including 15 upper-division credits with at least 5 credits at the 400 level. 2.0 minimum grade for each course counted toward the minor. At least 15 credits of upper-division geography courses must be taken at the UW.

Graduate Program

William Beyers, Graduate Program Coordinator

The Department of Geography has flexible programs of graduate study leading to the Master of Arts and Doctor of Philosophy degrees.

The aspirant to the master's degree is expected to complete all work for the degree in four to six quarters. The aspirant to the doctoral degree is expected to undertake two years of post-master's study and must take a departmental diagnostic examination upon entry, pass the General Examination, attain an appropriate level of competence in a foreign language or cognate field, and successfully complete a dissertation. Normally, doctoral program students complete all degree requirements in three to four years.

Admission Requirements

Admission to the graduate program normally requires a minimum GPA of 3.00 (on a 4.00 scale), or B. Students holding a master's degree must meet this minimum scholastic requirement, but also should have achieved a GPA higher than 3.00 for graduate studies completed. All applicants must take the Graduate Record Examination. Specific information regarding application procedures may be obtained by writing to the graduate program adviser.

Financial Aid

The department usually awards approximately 10 to 15 teaching assistantships for the academic year. Most of the assistantships are for teaching quiz sections for a larger lecture class. A few of the more advanced doctoral candidates may teach a class. Normally, several research assistantships are also available.

Correspondence and Information

Graduate Program Coordinator
408A Smith, Box 353550

Faculty

Chair

David C. Hodge

Professors

Beyers, William B. * 1962; PhD, 1967, University of Washington; economic geography, regional analysis, regional development.

Fleming, Douglas K. * 1963, (Emeritus); PhD, 1965, University of Washington; transportation geography (especially ocean and air), regional organization of western Europe.

Guest, Avery * 1972, (Adjunct); MS, 1964, Columbia University; MA, 1967, PhD, 1970, University of Wisconsin; demography, ecology, stratification.

Hodge, David C. * 1975; MS, 1973, PhD, 1975, Pennsylvania State University; urban geography, urban transportation geography, equity, gender.

Jackson, W. A. Douglas * 1955, (Emeritus); PhD, 1953, University of Maryland; Canada, political systems, nature and culture.

Krumme, Gunter * 1970; PhD, 1966, University of Washington; economic, organizational and marketing geography, location theory, regional development.

Marts, Marion E. * 1934, (Emeritus); PhD, 1950, University of Washington; water resources, conservation, resource policy.

Mayer, Jonathan D. * 1977; PhD, 1977, University of Michigan; medical geography, clinical applications, philosophy.

Morrill, Richard L. * 1955; PhD, 1959, University of Washington; spatial organization, migration, population, diffusion, regional planning/development, inequality.

Sherman, John C. * 1939, (Emeritus); PhD, 1947, University of Washington; cartography, graphics communication, remote sensing.

Thomas, Morgan D. * 1959; PhD, 1954, Queen's University (UK); regional economics, regional planning and development, technical innovation.

Velikonja, Joseph * 1964, (Emeritus); PhD, 1948, State University (Italy); social and political geography, international migration, immigrants in America, eastern Europe.

ZumBrunnen, Craig * 1977; PhD, 1973, University of California (Berkeley); resource analysis, Russia and NIS, environment, mathematical programming.

Associate Professors

Chan, Kam Wing * 1991; PhD, 1988, University of Toronto (Canada); economic development, urbanization, migration, China, Hong Kong.

Chang, Kuei-Sheng * 1966, (Emeritus); PhD, 1955, University of Michigan; economic geography of China, historical geography of exploration, Third World development.

Chrisman, Nicholas R. * 1987; PhD, 1982, University of Bristol (UK); geographic information systems, spatial error analysis.

Kakiuchi, George H. * 1957, (Emeritus); PhD, 1957, University of Michigan; Japan, agriculture, internal migration, regional geography.

Lawson, Victoria A. * 1986; PhD, 1986, Ohio State University; Latin America, political economy of development, feminist theory in development.

Nyerges, Timothy L. * 1985; PhD, 1980, Ohio State University; GIS, spatial decision support, urban, transportation, environment, groupware.

Assistant Professors

Jarosz, Lucy A. * 1990; PhD, 1990, University of California (Berkeley); political economy of development, food and agriculture, feminist geography, political ecology.

Mitchell, Katharyne 1993; PhD, 1993, University of California (Berkeley); urban, cultural and economic geography, Pacific Rim.

Sparke, Matthew 1995, (Acting); MA, 1991, PhD, 1996, University of British Columbia (Canada); human geography.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

GEOG 100 Introduction to Geography (5) I&S Jarosz, Mitchell, Sparke Introduction to the study of human geography and the major themes of the discipline. Topics include: human-environment interactions, migration and human mobility, patterns of health and nutrition, industrialization and urbanization, and the geography of culture and politics. Offered: AWSpS.

GEOG 102 World Regions (5) I&S Spatial study of world regions, based on historical, cultural, political, economic, and other factors. An attempt to understand the underlying forces that have led to the formation of regions and regional patterns.

GEOG 205 Introduction to Physical Sciences and the Environment (5) NW ZumBrunnen Major atmospheric, hydrologic, and geomorphic processes used to interpret the character, distribution, and human significance of different natural and human-altered environments. Includes laboratory exercises for science and nonscience majors, geography majors and nonmajors. Offered: AS.

GEOG 207 Economic Geography (5) I&S Beyers, Krumme The changing locations and spatial patterns of economic activity, including: production in agriculture, manufacturing, and services; spatial economic principles of trade, transportation, communications, and corporate organization; regional economic development, and the diffusion of technological innovation. Offered: AWS.

GEOG 230 Urbanization in Developing Nations (5) I&S Lawson Cities in their cultural and economic contexts, geographical patterns of cities, and internal city structure. Problems facing these rapidly growing cities and selected policy solutions. Offered: Sp.

GEOG 258 Maps and Map Reading (3) I&S Categories of maps and aerial photographs and their special uses; map reading and interpretation.

GEOG 277 Geography of Cities (5) I&S Hodge Study of 1) systems of cities—their location, distribution, functions, and competition; and 2) their internal structure—the location of activities within urban areas. Particular emphasis on current urban problems—sprawl, housing, segregation, economic growth, and metropolitan transportation. Offered: W.

GEOG 280 Introduction to the Geography of Health and Health Care (5) I&S Mayer Concepts of health from a geographical viewpoint, including human-environment relations, development, geographical patterns of disease, and health systems in developed and developing countries. Offered: Sp.

GEOG 301 Cultural Geography (5) I&S Jackson Analysis of the role of culture in the formation of landscape patterns; components of culture that contribute not only to a "sense of place", but also to the mosaic of settlement patterns and occupancy that can be traced to culture. Recommended: 100 or equivalent.

GEOG 302 The Pacific Northwest (3) I&S Beyers Settlement pattern in the Pacific Northwest, emphasizing economic and historical factors, including the location of resource-oriented industries, policies regarding the use of public lands, and bases of the development of major urban areas in the region. Offered: W.

GEOG 304 Western Europe (5) I&S Physical and socioeconomic characteristics of western Europe. Contemporary political and economic integration trends in their regional context.

GEOG 308 Canada: A Geographic Interpretation (5) I&S Sparke Study of Canada; emergence of a political-geographic and cultural entity and identity in North America that presents significant contrasts to the United States. Components that have helped shape Canadian earth-space and landscape. Offered: jointly with SISCA 308; Sp.

GEOG 313 East Asia (5) I&S Chan Introduction to the contemporary geography of East Asia, including China, Hong Kong, Taiwan, Japan, and Korea. Topics include: physical geography, historical settings, general development patterns, agriculture, population, industry, and trade. Focuses on major geographic issues in development. Case studies from different countries used to illustrate various themes.

GEOG 316 Urban Economics (5) I&S Application of economic analysis to urban trends, problems, and prescriptions, such as changing urban form and function, urban public finance, housing and renewal, poverty and race, transportation, and environmental problems. Prerequisite: ECON 201 or equivalent. Offered: jointly with ECON 316.

GEOG 326 Introduction to Geographic Research (5) I&S, QSR Chan Introduction to the tools of geographic research. Topics include defining problems, designing research, and methods for gathering and operationalizing statistics. Provides experience defining a geographic research problem, collecting and analyzing data, and drawing conclusions from that endeavor. Offered: AWS.

GEOG 330 Latin America: Landscapes of Change (5) I&S Lawson Examines operation of economic, social, and political processes across countries of Latin America—on international, national, and local scales—to understand common issues facing the region and different impacts in particular countries. Topics include internationalization of Latin American economies; agrarian and urban change; popular movements. Offered: W.

GEOG 333 Russia's Changing Landscape (5) I&S The Russian landscape as it has been affected by Soviet planning, migration and settlement, urbanization, industrialization, the results of collectivization in agriculture, and the growth of a transport network.

GEOG 335 Geography of the Developing World (5) I&S Characteristics and causes, external and internal, of Third World development and obstacles to that development. Special attention to demographic and agricultural patterns, resource development, industrialization and urbanization, drawing on specific case studies from Asia, Africa, and Latin America. Prerequisite: 100 or equivalent. Offered: jointly with SIS 335; W.

GEOG 336 China (5) I&S Chan China's environmental and historical settings. Human response to varied geographical conditions. Pattern and process of development in agriculture, industry, and urbanization. Offered: W.

GEOG 342 Geography and Inequality in the United States (5) I&S Morrill Geography of social and economic inequality. Spatial distribution of wealth and poverty and the possible causes. Geographic and other aspects of the alleviation of poverty. The geography of racial and ethnic discrimination, from Indian reservations to ghettos, as well as religious, gender, and age discrimination. Offered: Sp.

GEOG 349 Geography of International Trade (5) I&S Mitchell Examines international production and the circulation of commodities. Resource extraction and the international division of labor established during colonialism; production and trade during the period of empire and subsequent core-periphery relations; contemporary movement of commodities; role of the state in different economic, and growing Pacific Rim influence. Offered: A.

GEOG 350 Local Economies and Market Areas (5) I&S Krumme Intermediate economic geography.

Methods and concepts for analysis of small regional economies, market areas, and their development. Tools for population, employment, and consumer profiles. Locations, trading and transportation patterns, commodity flows, industrial linkages. Spatial constraints on producers, consumers. Economic impact analysis. E-mail access required. Offered: Sp.

GEOG 360 Principles of Cartography (5) I&S, QSR Chrisman, Nyerges Origins, development, and methods of cartography. Principles of data representation and map design for thematic and topographic mapping. Introduction to the use of computers for mapping. Offered: ASpS.

GEOG 366 Regional Development (3/5) I&S Thomas The process of regional economic development. Theories and conceptualizations of economic growth and structural change, technological change and industrial development, spatial variation in economic activities and government policies. Prerequisite: 207 or ECON 200 or equivalent. Offered: W.

GEOG 370 Problems in Resource Management (5) I&S ZumBrunnen Principles and practices of effective conservation and utilization of natural resources. Role of technology in resource use. Physical, political, and economic aspects of resource management for food, population, land, water, air, energy, and timber resources. Recommended: 100 or equivalent. Offered: Sp.

GEOG 371 World Hunger and Resource Development (5) I&S Jarosz Addresses issues of hunger and poverty in their relationship to resource development, population, and environmental change in Africa, Asia, and Latin America. Examines various approaches to the problem of world hunger such as population growth, agricultural development and modernization, and issues in sustainable resource development. Offered: A.

GEOG 375 Geopolitics (5) I&S Sparke Spatial aspects of international politics, with attention to the history of geopolitical concepts, perceptions of national space, the organization of territory, and the strategic use of geography to advance state goals. Offered: jointly with SIS 375.

GEOG 380 Geographical Patterns of Health and Disease (4) I&S Mayer Geography of infectious and chronic diseases at local, national, and international scales; environmental, cultural, and social explanations of those variations; comparative aspects of health systems. Prerequisite: 100 or equivalent. Offered: A.

GEOG 397 Tutorial for Majors (1) Lawson Overview of the discipline of geography including faculty research interests, teaching philosophies, and course offerings as well as essential study and research skills and career development strategies. Students meet concurrently with faculty adviser to identify academic interests and devise plan of studies. Credit/no credit only. Offered: ASp.

GEOG 401 Culture, Capital, and the City (5) I&S Mitchell Examines current themes in social theory as they apply to the urban landscape. Includes the interconnections of cultural and economic processes and the spatial patternings of race, class, and gender in the modern urban context.

GEOG 426 Quantitative Methods in Geography (5) I&S Hodge Quantitative methods for empirical research in geography. Emphasis on statistical analysis; use of geographic data bases like the United States Census; understanding special issues and problems associated with geographically ordered data; verbal and graphic presentation in a computer environment. Prerequisites: 326, a course in statistics, or permission of instructor. Offered: Sp.

GEOG 430 Contemporary Development Issues in Latin America (5) I&S Lawson Contemporary development issues in Latin America, seen from a spatial

perspective. Concept of development; competing theories as related to various Latin American states. Economic structural transformation, migration, urbanization, regional inequality, and related policies. Offered: A.

GEOG 431 Geography and Gender (5) I&S Jarosz Examines theories and case studies across international, national, and regional scales in order to illustrate the impacts of social and economic processes upon the construction of gender in particular places. Offered: W.

GEOG 432 Population and Urbanization Problems of Russia and the Newly Independent States (5) I&S ZumBrunnen Historical background and evolution of Soviet/Russian population and urbanization processes and problems. Distinguishing demographic characteristics and recent trends in the growth and migration of rural and urban populations. Analysis of problems associated with ethnicity and nationality, regional-temporal labor demand and supply issues, and spatial-temporal well-being. Offered: odd years; Sp.

GEOG 433 Resource Use and Management in Russia and the Newly Independent States (5) I&S Jackson, ZumBrunnen Geographic and historical perspectives on Soviet natural resource use and management in theory and practice. Implications of the breakup of the USSR for natural resource use and management. Offered: odd years; W.

GEOG 434 Southeast Asia: Conflict and Development (5) I&S Mitchell Study of complexity of ethnic, cultural, and socioeconomic background in relation to division and rivalry in past; conflict and development in contemporary southeast Asia. Recommended: 100.

GEOG 435 Industrialization and Urbanization in China (5) I&S Chan Examines the impacts of industrialization strategies adopted by the Peoples Republic of China on urbanization and rural-urban relations. Topics include: economic development strategies, industrial geography, rural industrialization, urban development patterns, migration, and urbanization policies. Prerequisite: one course on contemporary China or permission of instructor. Offered: Sp.

GEOG 440 Regional Analysis (5) I&S Beyers Regional industrial structures and economic change. Application of shift-share, cohort, multiplier, input/output, and programming models to the analysis and projection of regional population and employment patterns, regional growth differentials, and regional impact analysis. Recommended: 207 and introductory macroeconomics. Offered: Sp.

GEOG 441 Technology and Industrial Change (5) I&S Thomas The "technology factor" in the process of industrial change in a turbulent contemporary world. Restructuring the world economy, transnational corporations, industry strategies and government policies. Prerequisite: 207 or permission of adviser.

GEOG 442 Social Geography (5) I&S Review of concepts and methods of postwar social geography: historical roots and present orientations. Study of social spatial systems, their structures and functioning. Recommended: 200.

GEOG 443 Location and Movement Models (5) I&S Morrill Application of models of optimum location and allocation; assignment, transportation, and spatial equilibrium; spatial interaction; geographic simulation; and spatial diffusion.

GEOG 445 Population Distribution and Migration (5) I&S Morrill Relation of population distribution to environment, economic development, and culture. Frontier and rural settlement, urbanization, and suburbanization. Regional variation in age, ethnicity, fertility, and mortality. Causes and effects of migration from the world to the local scale. Recommended: 100 or 200 or SOC 331. Offered: A.

GEOG 447 The Geography of Air Transportation (5) I&S Geographic analysis of world air routes, passenger and cargo flows, and airport activities; consideration of physical, economic, political, and institutional determinants of routes and flows.

GEOG 448 Geography of Transportation (5) I&S Mayer Circulation geography, principles of spatial interaction emphasizing commodity flow, the nature and distribution of rail and water transport, the role of transport in area development.

GEOG 449 Geography of Ocean Transportation (5) I&S Geographic analysis of ocean trade routes, cargo and passenger flows, and port activities. Evaluation of the role of the transportation carrier in international trade.

GEOG 450 Theories of Location (5) I&S Krumme Neoclassical and modern theories of location, land use, and spatial structure. Decision and organizational concepts. Location principles, patterns, and processes in the context of rural, commercial, industrial, residential, and recreational activities focusing on the effects of transportation, communication, uncertainty, and other factors. Prerequisite: 207 and ECON 200 or permission of instructor. Offered: A.

GEOG 458 Map Sources and Errors (5) I&S Chrisman Analysis and appraisal of source materials for maps, production constraints of mapping agencies, coverage and quality. Focus on errors inherent in maps and map derived data; judgment of fitness for specific applications. Prerequisite: 360 or permission of instructor. Recommended: CIVE 316 or CETS 414.

GEOG 460 Geographic Information Systems Analysis (5) I&S Chrisman Methods of Analysis provided by geographic information systems (GIS). Operations on map information including map overlay, aggregation/disaggregation, and other spatial and attribute procedures. Exposure to raster and vector software. Review of capabilities of current available GIS software. Prerequisite: 360 or permission of instructor. Offered: A.

GEOG 461 Urban Geographic Information Systems (5) I&S Nyerges Use of geographic information systems to investigate urban/regional issues; focus on transportation, land-use issues; all urban change problems considered. GIS processing strategies. Problem definition for GIS processing. Data collection, geocoding issues. Data structuring strategies. Prerequisites: 277 or equivalent, 360 or equivalent; familiarity with computers. Offered: W.

GEOG 463 Geographic Information Systems Workshop (5) I&S Nyerges Practical experience applying geographic information system (GIS) tools to analyze spatial data. Workshop format requires student-motivated projects; diverse principles encouraged. Prerequisite: 460 or 461 or permission of instructor. Offered: Sp.

GEOG 465 Analytical Cartography (5) I&S Chrisman Algorithms and data structures for selected topics in computer-assisted cartography. Emphasis on point, line, area, and surface data representation, map design, generalization, and data transformations. Prerequisites: 360, CSE 142 and 143 or equivalent, or permission of instructor. Offered: odd years; W.

GEOG 471 Methods of Resource Analysis (5) I&S ZumBrunnen Economic and noneconomic criteria for resource analysis. Theory and methods of linear models of natural resource analysis. Includes materials-balance modelling, residuals management, constrained system optimization approaches to water quality analysis, land-use patterns and interregional energy use, and multiple objective planning techniques applied to natural resource problems. Prerequisite: 370 or permission of instructor.

GEOG 478 Intraurban Spatial Patterns (5) I&S Hodge, Morrill Geographic patterns and processes

within metropolitan areas. Economic land-use patterns (commercial and industrial location), social land-use patterns (segregation, housing, and neighborhood change), urban political geography, analysis of urban infrastructure, and assessment of contemporary and future trends in urban development. Offered: A.

GEOG 490 Field Research: The Seattle Region (6) I&S Hodge, Morrill Field methods for contemporary urban research. Survey designs used in the analysis of transportation, land use, location of employment, shopping and housing, political fragmentation, and environmental degradation. Field report required, based on field work in the Seattle region.

GEOG 492 Library Research in Geography (2) I&S Introduction to library research methods in geography. Review and assessment of geographical bibliographies and abstract services for monographs, periodicals, gazetteers, dictionaries, encyclopedias, government publications, and statistical sources. Credit/no credit only.

GEOG 494 Senior Essay (3) I&S Supervised individual research and writing of major paper during senior year. Prerequisites: senior standing and permission of faculty sponsor. Offered: AWSp.

GEOG 495 Special Topics (* max. 10) I&S Topics vary and are announced in the preceding quarter. Offered: AWSp.

GEOG 496 Internship in Geography (3/5, max. 12) Internship in the public or private sector, supervised by a faculty member. Credit/no credit only. Prerequisites: sophomore standing or above in geography and permission of faculty sponsor and undergraduate adviser. Offered: AWSpS.

GEOG 497 Tutorial in Geography (1-3, max. 6) I&S Mayer Intensive directed study and tutoring. Literature reviews, formulations of project outlines and research designs, orientation in contemporary geographic thought and trends. Directed writing. Required for honors students. Prerequisite: permission of instructor. Offered: AWSp.

GEOG 498 Undergraduate Seminar in Economic Geography and Regional Science (3) I&S Krumme Selected advanced topics and current problems in economic geography, including location, transportation, trade, marketing, international investment, regional analysis, technological change, and economic development. Emphasis on critical examinations of theoretical and empirical work. Opportunity for the development of conceptual frameworks for undergraduate (e.g., senior essay) research. Offered: A.

GEOG 499 Special Studies (* max. 15) Supervised reading programs, undergraduate and graduate library and field research; special projects for undergraduate honors students. Prerequisite: permission of instructor or department adviser. Offered: AWSpS.

Courses for Graduates Only

GEOG 500 Contemporary Geographic Thought (4, max. 8)

GEOG 502 Professional Writing in Geography (* max. 6)

GEOG 505 Research Seminar: China and North-east Asia (3, max. 6) Chan Offered: A.

GEOG 506 Research Seminar: Southeast Asia (3, max. 6)

GEOG 507 Research Seminar: Canadian Problems (3, max. 6) Consideration of the spatial dimensions of Canadian socioeconomic, cultural, and political development, with emphasis on resource potentials and relations with the United States, Japan, and other important trading partners. Prerequisite: 308 or permission of instructor. Offered: jointly with SISCA 507.

GEOG 511 Contemporary Methodologies and Philosophies in Geography (4) Overview of major philosophies and methodologies of contemporary geographic research; historical roots of contemporary geography; roles of positivism, behaviorism, and other philosophical schools in geography; the role of space and regions as unifying and explanatory concepts in geography. Offered: A.

GEOG 520 Geographic Information Representation (3) *Nyerges* Current issues in geographic information representation for cartography and geographic information systems. Includes representations for visualization and databases. Prerequisite: graduate standing and one course in GIS or permission of instructor.

GEOG 526 Advanced Quantitative Methods in Geography (4) *Morrill*

GEOG 531 Latin American Development Seminar (3) *Lawson* Evolution of development theory in Latin America from a spatial perspective. Theories and development issues, using case studies from Latin America. How geographers have conceptualized development problems and solutions. Prerequisite: 430. Offered: W.

GEOG 532 Rural Development Seminar (3) Contemporary issues in rural development theory related to regional and agrarian change. Offered: Sp.

GEOG 533 Research Seminar: Soviet Union (3, max. 6) *ZumBrunnen*

GEOG 538 Research Seminar: Geography of Transportation (3, max. 6) *Mayer*

GEOG 540 Research Seminar: Industrial Geography (3, max. 6) *Byers* Offered: W.

GEOG 542 Research Seminar: Social and Population Geography (3, max. 6) *Morrill* Offered: W.

GEOG 550 Research Seminar in Location Theory (3) *Krumme*

GEOG 553 Cultural Critique and the Landscape (4) *Mitchell* Focuses on important contemporary topics in cultural geography. Examines current theoretical debates in anthropology, sociology, geography, feminist criticism, and cultural studies as they relate to the landscape. Include critical questions surrounding issues of representation and ethnography. Designed to help student prepare for advanced fieldwork. Offered: Sp.

GEOG 556 Seminar in Urban Economics (3) Use of economic theory to explain land-use trends, transportation, housing and renewal, the ghetto, and the public economy in urban areas. Prerequisites: ECON 300, 301, or equivalent. Offered: jointly with ECON 556.

GEOG 580 Geographic Information and Analysis (3, max. 6) *Chrisman* Current research topics in geographic information systems. Particular emphasis on analytical methods, and their use in practical circumstances. Prerequisite: graduate status in GIS or related field. Offered: W.

GEOG 561 Geographic Information Systems Management (3) *Nyerges* Geographic information system specification, design, and implementation in an institutional context. Focus on use and value of geographic information as related to system design and decision-making requirements. Systems integration issues. Standards and geographic data sharing. Prerequisites: 460 or 461 or equivalent and permission of instructor, or 465.

GEOG 563 Algorithms and Data Structures for Geographic Information Systems (5) *Chrisman* Anatomy of a software package for geographic information processing. Emphasis on analysis of algorithmic complexity and software design techniques. Presents dynamic data structures, persistence of temporal data, and data flow algorithms. Prerequisites: 460,

465, and CSE 326 or 373.

GEOG 566 Regional Development Seminar (3) *Thomas* Regional economic development theories and methodologies. The dynamic roles of social, economic, technical, and institutional factors in the process of regional development. Impacts of industry and firm strategies and government policies.

GEOG 567 Research Seminar: Geography and Industrial Development (3, max. 6) *Thomas* Spatial and economic dimensions of contemporary restructuring of world economy. Explanatory roles of such factors as governments, technical change, complex corporations, capital markets, information costs, transfer costs, and international trade in this process of global restructuring.

GEOG 570 Research Seminar: Natural Resources Analysis (3, max. 6) *ZumBrunnen*

GEOG 575 Research Seminar: Geography in Politics and World Affairs (3, max. 6) *Sparke* Literature in political geography and related fields pertaining to state and interstate relationships. Prerequisites: 375, 475. Offered: A.

GEOG 576 Geography in Politics (3, max. 6) *Sparke* Literature in political geography and related fields pertaining to state and interstate relationships. Offered: jointly with SIS 575.

GEOG 577 Research Seminar: Internal Spatial Structure of Cities (4, max. 8) *Hodge* Offered: A.

GEOG 580 Medical Geography (3) *Mayer* Geography of disease, consideration in health systems planning. Analysis of distributions, diffusion models, migration studies. Application of distance, optimal location models to health systems planning; emergency medical services; distribution of health professionals; cultural variations in health behavior. Prerequisites: familiarity with social science research; health-related issues. Offered: jointly with HSERV 586; W.

GEOG 581 Seminar in Medical Geography (3) *Mayer* Research and methodologies in medical geography; critical analysis of readings in medical geography; interrelations of medical geography with (1) other geographical specialties, (2) other health sciences. Prerequisite: 580. Offered: odd years; W.

GEOG 598 Geography Colloquium (1, max. 3) Participation in, and critique of, student thesis and dissertation research, faculty research, and visitor contributions. Offered: AWSp.

GEOG 599 Effective Teaching of Geography (1) Designed for the ongoing development of effective teaching and professional skills. Topics/activities include micro-teaching, communications and presentation skills; course organization, time management, personal and small group dynamics; design of geography curricula using simulations and computer-assisted instruction in the classroom, and fostering of creative thinking. Credit/no credit only. Offered: A.

GEOG 600 Independent Study or Research (*) Offered: AWSp.

GEOG 700 Master's Thesis (*) Offered: AWSp.

GEOG 800 Doctoral Dissertation (*) Offered: AWSp.

of the department provides a base of required courses for the undergraduate and contains a wide variety of more specialized upper-division courses that reflect the diversity of the geological sciences.

The department is well equipped with modern analytical, computational, and experimental facilities and has sizable research/teaching collections of rock, minerals, and fossils.

Undergraduate Program

Adviser
George Bergantz

The Department of Geological Sciences offers two undergraduate degrees. The Bachelor of Arts degree is designed for students who wish to obtain a broad understanding of the history, composition, and dynamics of the earth, either for personal enrichment or as training for careers such as science journalism, environmental law, or secondary school teaching. The Bachelor of Science degree, which requires more credits in mathematics and physical sciences, is designed for students who intend eventually to enter a graduate program in earth science and pursue a professional career. The Biology Option allows B.S. students interested in paleontology and paleobiology to substitute certain biology courses for mathematics and physical sciences.

Courses are also offered for nonmajors interested in understanding the processes responsible for the distribution of continents, landscapes, the availability of natural resources, and the occurrence of such natural hazards as earthquakes and volcanoes.

Bachelor of Science

Major Requirements: GEOL 101 or 205, 306, 311, 320, 321, 340, 401 plus 9 credits at the 400 level in geological sciences, excluding GEOL 401, 490, 498, and 499. General Option: MATH 124, 125, 126; CHEM 140 or 145, 141, 150 or 155; PHYS 121/131, 122/132; PHYS 123/133 or CHEM 160; and one course from the following five: CHEM 237, 350; MATH 307, 308; STAT 311. Biology Option: MATH 124, 125, 126; PHYS 121/131; CHEM 140 or 145, 141, 150 or 155; two courses from BIOL 201, 202, 203; PHYS 122/132 or CHEM 160 or STAT 311 or 3-5 credits of upper-division courses in biological sciences. All required courses must be completed with grades not lower than 2.0.

Bachelor of Arts

Major Requirements: GEOL 101 or 205, 306, 311, 320, 321, 340, plus 19 credits at the 300 or 400 level (minimum of 10 credits at the 400 level), excluding GEOL 490, 498, and 499; MATH 124, 125; PHYS 121/131; CHEM 140 or 145; 13 credits from the following: MATH 126; PHYS 122/132, 123/133; CHEM 150 or 155, 160; BIOL 101-102, 201, 202, 203; CSE/ENGR 142; STAT 311. All required courses must be completed with grades not lower than 2.0.

Graduate Program

Bruce Nelson, Graduate Program Coordinator

The Department of Geological Sciences offers graduate programs leading to the degrees of Master of Science and Doctor of Philosophy. The department emphasizes a rigorous quantitative approach to significant problems in the geological sciences. Study in virtually all branches of geology is possible; any emphasis on field, laboratory, or theoretical work is largely dictated by the nature of the research problem selected.

Research Facilities

Analytical, experimental, and computational research facilities include a wet chemistry laboratory, a Finnigan SOLA ICP-MS for elemental and isotopic analyses of

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The geological sciences include the collection and interpretation of field data as well as the application of principles of physics, chemistry, biology, and mathematics to the study of the earth, its environment, its origin, and the processes by which it has been transformed and reconstituted through time. The curriculum

rocks and fluids, a JEOL 733 Superprobe with EDS/WDS for mineral analysis, a thermal-ionization mass spectrometer and clean laboratory for separation of radiogenic and trace elements (Rb/Sr, Sm/Nd, U, Pb), two fully-automated single-crystal X-ray diffractometers for crystal-structure studies at high temperature, a computer laboratory, a remote-sensing laboratory with an image-processing system with LANDSAT tape library and spectral reflectance equipment, and gas-atmosphere-controlled furnaces. Additional facilities are provided by the Burke Memorial Washington State Museum with paleontological laboratory and collections (extensive reference collections of invertebrate, vertebrate, and plant fossils; mineralogic collections) and the Quaternary Research Center (scanning and transmission electron microscopes, radiocarbon and stable-isotope research, palynology, snow and ice research, and periglacial laboratory).

Master of Science

Graduation Requirements: With Thesis—36 credits, of which 18 must be in courses at the 500 level or above and up to 9 may be for thesis (GEOL 700). Final examination consists of oral presentation and defense of thesis. Without Thesis—45 credits, of which 18 must be in courses at the 500 level or above, which includes a 5-credit research paper (GEOL 600). Final examination is oral and is administered by the supervisory committee. All students must present approved field courses or other approved field experience.

Doctor of Philosophy

Admission Requirements: Either Master of Science or Master of Arts degree in geological sciences or related field.

Graduation Requirements: Credits variable; one-half total program, including dissertation, must be in courses at the 500 level or above; a minimum of 27 credits for thesis (GEOL 800); at least 18 credits completed with numerical grade in courses numbered 400 and 500. Completion of two years of graduate study, passage of the Ph.D. entrance requirement which includes the defense of a proposal, General Examination, and admission to candidacy; completion of acceptable dissertation and passage of Final Examination.

Financial Aid

The department awards annually a number of teaching assistantships, endowed fellowships and scholarships, and research assistantships. Industry-sponsored grants are also available. Qualified students are strongly encouraged to apply for National Science Foundation and other fellowships available through national and private agencies.

Correspondence and Information

Graduate Program Coordinator
63 Johnson, Box 351310

Faculty

Chair

Mark S. Ghiorso

Professors

Atwater, Brian F. 1986, (Affiliate); MS, 1974, Stanford University, PhD, 1980, University of Delaware; paleoseismology, neotectonics, regional geology.

Adams, John B. * 1975; MS, 1958, PhD, 1961, University of Washington; planetology, remote sensing.

Bostrom, Robert C. * 1964, (Emeritus); MA, 1952, PhD, 1961, Oxford University (UK); geotectonics, geophysics.

Brown, J. Michael * 1984, (Adjunct); PhD, 1980, University of Minnesota; experimental and theoretical mineral and rock physics.

Cowan, Darrel S. * 1974; PhD, 1972, Stanford University; structural geology and regional tectonics.

Creager, Joe S. * 1958, (Emeritus); PhD, 1958, Texas A&M University; geological oceanography, sedimentology.

Crosson, Robert S. * 1966, (Adjunct); PhD, 1966, Stanford University; seismology, structure and tectonics, earthquake hazards.

Delaney, John R. * 1977, (Adjunct); PhD, 1977, University of Arizona; geological oceanography, origin of oceanic crust, igneous petrology.

Dunne, Thomas * 1973, (Affiliate); PhD, 1969, Johns Hopkins University; geomorphology and hydrology.

Evans, Bernard W. * 1969; PhD, 1959, Oxford University (UK); petrology and mineralogy.

Ghiorso, Mark S. * 1980; MA, 1978, PhD, 1980, University of California (Berkeley); geochemistry.

Ghose, Subrata * 1972; PhD, 1959, University of Chicago; mineralogy.

Gillespie, Alan R. * 1985, (Research); PhD, 1982, California Institute of Technology; landscape evolution, paleoclimate, geochronology, and applications of remote sensing.

Grootes, Pieter M. * 1977, (Affiliate); PhD, 1977, University of Groningen (Netherlands); paleoenvironments, glaciology, and global change from ice core isotope records.

Hallet, Bernard * 1980; PhD, 1975, University of California (Los Angeles); glaciology, permafrost studies, geomorphology.

Johnson, Harlan Paul * 1976, (Adjunct); PhD, 1972, University of Washington; paleomagnetism and marine geophysics.

Leopold, Estella B. * 1976, (Adjunct); PhD, 1955, Yale University; paleoecology, pollen and seed analysis, late Cenozoic environment.

Mallory, V. Standish * 1952, (Emeritus); PhD, 1952, University of California (Berkeley); biostratigraphy, micropaleontology, paleoecology.

McCallum, Ian S. * 1970; PhD, 1968, University of California; petrology.

Merrill, Ronald T. * 1967; PhD, 1967, University of California (Berkeley); geomagnetism, geophysics of solids, rock magnetism.

Newhall, Christopher 1994, (Affiliate); PhD, 1980, Dartmouth College.

Porter, Stephen C. * 1962; PhD, 1962, Yale University; Quaternary geology and geomorphology.

Raymond, Charles F. * 1969, (Adjunct); PhD, 1969, California Institute of Technology; glaciology, glacier and ice sheet dynamics.

Rensberger, John M. * 1966; PhD, 1967, University of California (Berkeley); Cenozoic mammalian evolution, taxonomy, and biostratigraphy.

Sack, Richard O. * 1993, (Affiliate); PhD, 1979, Harvard University; petrology, thermochemistry of rock-forming minerals.

Smith, J. Dungan * 1967, (Affiliate); PhD, 1968, University of Chicago; geophysical fluid dynamics, sediment transport mechanics.

Smith, Stewart W. * 1970, (Emeritus); PhD, 1961, California Institute of Technology; seismology, earthquake risk, seismotectonics.

Stüiver, Minze * 1969; PhD, 1958, University of Groningen (Netherlands); geochronology, isotope geology.

Swanson, Donald A. * 1992, (Affiliate); PhD, 1964, Johns Hopkins University; volcanology.

Tsukada, Matsuo * 1969, (Adjunct); PhD, 1961, Osaka City University (Japan); interpretation of Quaternary events from palynological and kindred data.

Ward, Peter D. * 1984; PhD, 1976, McMaster University (Canada); invertebrate paleontology, paleobiology.

Associate Professors

Anderson, Patricia M. 1994, (Research); MA, 1976, PhD, 1982, Brown University; Quaternary palynology, paleoecology, paleoclimatology.

Bergantz, George W. * 1988; PhD, 1988, Johns Hopkins University; physical petrology, heat and mass transfer, geophysics.

Bourgeois, Joanne * 1980; PhD, 1980, University of Wisconsin; sedimentology, sedimentary geology.

Boyer, Steven E. * 1987, (Research); PhD, 1978, Johns Hopkins University; structural geology.

Cheney, Eric S. * 1964; PhD, 1964, Yale University; economic geology, sequence stratigraphy.

Iverson, Richard M. * 1990, (Affiliate); PhD, 1984, Stanford University; geomorphology.

Montgomery, David R. * 1991, (Research); PhD, 1991, University of California (Berkeley); earth surface processes, especially those occurring in mountain drainage basins.

Nelson, Bruce K. * 1986; PhD, 1985, University of California (Los Angeles); isotopic and geochemical investigations.

Stewart, Richard J. * 1969; PhD, 1970, Stanford University; sedimentary petrology, diagenesis of sediment.

Vance, Joseph A. * 1957, (Emeritus); PhD, 1957, University of Washington; igneous and metamorphic petrology, general geology.

Assistant Professors

Booth, Derek D. 1980, (Adjunct Research); PhD, 1984, University of Washington; geomorphology, environmental geology.

Brazlunas, Thomas F. 1990, (Research); MS, 1975, State University of New York (Stony Brook); PhD, 1989, University of Washington.

Bruner, William M. * 1983, (Affiliate); PhD, 1980, University of California (Los Angeles); geomechanics.

McTigue, David F. * 1993; PhD, 1979, Stanford University; mechanics of geological materials and processes, sediment transport, porous media.

Senior Lecturer

Chernicoff, Stanley E. 1981; PhD, 1980, University of Minnesota; geomorphology.

Lecturer

Swanson, Terry W. 1991; MA, 1989, University of California (Davis); PhD, 1994, University of Washington; cosmogenic isotopes, Quaternary studies.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

GEOL 100 Dinosaurs (2) NW Rensberger Biology, behavior, ecology, evolution, and extinction of dinosaurs, and a history of their exploration. With dinosaurs as focal point, course also introduces the student to how hypotheses in geological and paleobiological science are formulated and tested. Offered: A.

GEOL 101 Introduction to Geological Sciences (5) NW Chernicoff Survey of the physical systems that give the earth its form. Emphasizes the dynamic nature of interior and surface processes and their relevance to mankind and stresses the value of rocks and earth forms in the understanding of past events. A course with laboratory for nonscience majors. Not open for

credit to students who have taken 205. Field trips. Offered: AWSp.

GEOL 205 Physical Geology (5) NW Introduction to the physical and chemical processes of the earth's surface and interior. Plate tectonics, earthquakes, volcanism, glaciation. Optional field trips to Cascades and Olympics. Background in geology not required but science background desirable. Not open for credit to students who have taken 101. Offered: AW.

GEOL 300 Geology of the National Parks (5) NW Review of fundamental geological processes, using North American parks and monuments as examples of natural laboratories. Includes volcanism, glaciation, water and wind erosion, plate-tectonic forces as preserved in geologic exposures of National Parks. Specific topics explored in laboratory sessions and field trips. Prerequisite: 101 or 205 or equivalent.

GEOL 302 Great Ice Age (5) NW Chemicoff Growth of mile-thick ice sheets, worldwide lowering of sea level, and other changes that accompany the harsh environments of a global ice age. Geology of the last three million years, focusing on the geological and ecological impact of our current ice age. Prerequisite: 101 or 205.

GEOL 303 Geologic Hazards (5) NW Geological forces dramatically alter the earth's surface, devastating communities, taking human lives. Uses lectures and field work to examine geological hazards affecting civilizations around the world. Northwest examples illustrate causes and effects of many catastrophic geological processes, including: earthquakes, volcanoes, floods, glaciers, landslides. Prerequisite: 101 or 205 or permission of instructor.

GEOL 304 Earthscapes (5) NW Introduction to study of landforms and geomorphic processes. Topics include weathering, soils, erosion, mass wasting, rivers, glaciers, coastal landscapes, and arid landscapes. Laboratory analysis of landforms, with the writing of scientific abstracts, is included. Optional weekend field trips introduce students to geomorphic landscapes found in western Washington. For non-majors.

GEOL 306 Evolution of the Earth (5) NW Bourgeois Earth and its physical and biological aspects through time. Origin of earth, its early history, and development of continents and ocean basins as chronicled by the rock and fossil record. Field trips required. Prerequisite: 101 or 205. Offered: W.

GEOL 308 Geology of the Northwest (5) NW Chemicoff Geologic history of Washington, Oregon, and Idaho. Emphasis on use of geologic principles in interpreting evidence found in landscapes and rocks. Two day-long weekend field trips required. Prerequisite: 101 or 205 or equivalent.

GEOL 310 Planetary Geology (5) NW Irving Up-to-date survey of geological features and processes on and within planets and their moons deduced from sampling, remote sensing, spacecraft imagery, and theory. Comparative discussion of volcanism, tectonics, surface processes, and thermal evolution. Examination of moon rocks and meteorites. Prerequisite: 101 or 205.

GEOL 311 Introductory Geomorphology (5) NW Hallet Processes that generate landscapes. Two one-day field trips. Prerequisites: 101 or 205, and prior or concurrent enrollment in PHYS 121. Offered: A.

GEOL 312 Volcanoes and Glaciers of the Pacific Northwest (3) NW Irving Introduction to volcanic and glacial processes, emphasizing examples in the Pacific Northwest. Volcanic products, landforms, hazards, prediction, and history. Relationship to tectonics. Nature and distribution of present and former glaciers in Washington. Two all-day Saturday field trips to Cascade volcanoes required.

GEOL 313 Environmental Geology (4) NW Analysis of geologic constraints upon human activity and the

environmental consequences of such activity. Topics include hillslope processes, fluvial processes, earthquake and volcanic hazards, and environmental aspects of the development of water resources. Prerequisites: 101, 205, or upper division standing in engineering or landscape architecture or permission of instructor. Recommended: MATH 120. Offered: A.

GEOL 320 Mineralogy (5) NW Ghiorso Introduction to mineralogy, including elementary crystallography (lattice types, external morphology, stereographic projection), elementary crystal physics (relationship of physical properties, including tensor properties to crystal symmetry), and elementary crystal chemistry (structures, bonding), especially of the silicates. Prerequisites: CHEM 140, MATH 124. Offered: W.

GEOL 321 Principles of Petrology (5) NW McCallum Description, classification, and origin of igneous, metamorphic, and sedimentary rocks, with laboratory hand specimen study of rock specimens. Two one-day field excursions. Prerequisite: 320 or equivalent. Offered: Sp.

GEOL 340 Structural Geology (5) NW Mechanics of rock deformation; description, classification, origin, and tectonic significance of common structures. Emphasizes interpretation and analysis of geologic maps and cross-sections. Prerequisites: MATH 124, PHYS 121. Offered: Sp.

GEOL 401 Field Geology (10) NW Geologic mapping in diverse areas in the western United States. Development of skills in mapping, field interpretation, and report writing. Students are responsible for their own living expenses while in the field. Prerequisites: 321 and 340. Recommended: 306 and 311. Offered: S.

GEOL 403 Principles of Paleobiology (4) NW Ward Fossil record and methods of analysis. Biologic systems in geologic time, including preservation, variation, population structure, adaptation, functional morphology, biostratigraphy, paleoecology, evolution, and biogeography. Prerequisites: 101 or 205, and 306.

GEOL 405 Geophysical Methods and the Earth's Interior (3) NW Bergantz General introduction to geophysical methods with application to geological features at a variety of scales from ore deposits and sedimentary basins to the large scale structure of the core and mantle. Topics include the characterization of the earth's gravity, heat flow, seismic, and magnetic features. Prerequisite: MATH 124. Recommended: 321, 340. Offered: A.

GEOL 409 Great Geological Issues (3) NW Bourgeois History and development of geological and paleontological theories and controversies; philosophy and methodology that have driven scientific inquiry in the earth sciences. Prerequisite: advanced standing in geological sciences or course work in history of science (e.g., HIST 311, 312), or permission of instructor. Offered: alternate years.

GEOL 410 Introduction to Geological Remote Sensing (4) NW Adams Principles of image interpretation for geologists. Study of land forms, structure, lithology, surface processes using aircraft and satellite data. Use of digital multispectral images and radar images for geological mapping. Prerequisite: 311. Offered: A.

GEOL 412 Fluvial Geomorphology (5) NW Hydraulic, sedimentologic, and morphological characteristics of streams and valley floors. Landscape evolution by stream erosion and deposition. Interpretation of fluvial sedimentary environments. Five field exercises emphasize the quantitative analysis of fluvial processes and channel forms and the acquisition of various skills, such as mapping, topographic surveying, and report writing. Prerequisites: 311, MATH 125, PHYS 121. Offered: alternate years; Sp.

GEOL 413 Hillslope Geomorphology (5) NW Theoretical, laboratory, and field study of hillslope evolution by mass wasting and water erosion. Five field

exercises emphasize the quantitative analysis of geomorphic processes and the acquisition of various skills, such as mapping, topographic surveying, and report writing. Prerequisites: 311, MATH 125, PHYS 121. Offered: alternate years; Sp.

GEOL 414 Image Interpretation (4) NW Adams Image interpretation in geological remote sensing. Analysis of aircraft and satellite images to solve field problems. Aerial stereo photography, digital multispectral images, thermal IR, radar images. Prerequisite: 410. Offered: W.

GEOL 415 Principles of Glaciology (3) NW Hallet, Porter, Raymond, Stuiver, Warren Snow deposition and metamorphism, avalanches, heat and mass balance at snow and ice surfaces, glacier flow, ice sheets, sea ice, permafrost, methods of paleoclimate reconstruction, Ice Age theories. Prerequisite: permission of instructor. Offered: jointly with GPHYS 415; A.

GEOL 416 Glacial Geology (3) NW Porter Interpretation of glacial environments and history through study of sediments and landforms; stratigraphic approaches, chronology, reconstructions, applications. Recommended: 311, 415.

GEOL 417 Quaternary Glacial Ages (3) NW Porter Physical, biological evidence of climatic change during Quaternary Period; stratigraphy, chronology. Impact of alternating glacial/interglacial cycles on earth's terrestrial, marine environments. Theories on causes of climatic variation. Prerequisite: introductory course in earth science and biological science. Offered: jointly with QUAT 417.

GEOL 419 Glacial Landscapes and Deposits (3) NW Hallet Development of steep-sided valleys, turquoise lakes, deep cirques, craggy peaks. Physics of glacial erosion and deposition. Geological and geotechnical properties of glacial sediments. Prerequisites: 311, 415.

GEOL 423 Optical Mineralogy (2) NW Evans Petrographic microscopy and recognition of common minerals in thin section. Prerequisite: 320. Offered: A.

GEOL 424 Petrography and Petrology of Igneous Rocks (5) NW McCallum Systematic study of igneous rocks and their origin, using the petrographic microscope. Prerequisite: 423. Offered: W.

GEOL 425 Petrography and Petrology of Metamorphic Rocks (5) NW Evans Mineralogy, textures, and origins of metamorphic rocks; metamorphic facies and metamorphic phase equilibria; controls of metamorphism. Prerequisite: 424 or equivalent. Offered: Sp.

GEOL 426 Petrology and Petrography of Sedimentary Rocks (5) NW Stewart Mineralogy, textures, and origin of sedimentary rocks, using petrographic microscope. Prerequisite: 320 or equivalent.

GEOL 430 Invertebrate Paleontology (5) NW Ward Important larger invertebrate groups; morphology, classification, stratigraphic distribution, evolution, paleoecology. Prerequisite: 306 or permission of instructor.

GEOL 432 Paleocology of Invertebrates (5) NW Properties of fossil populations and interpretation of habit and habitat in the geologic past; applications to interpretation of the stratigraphic record.

GEOL 435 Seismic Exploration (5) NW Brown Introduction to theory and practice of seismic exploration. Application of refraction and reflection techniques to problems in engineering geology and mineral exploration. Constraints in the interpretation of subsurface structure. Prerequisites: 340, MATH 126, PHYS 123. Offered: jointly with GPHYS 435.

GEOL 437 Fossil Vertebrates (5) NW Rensberger Highlights in evolutionary history of the fossil vertebrates, from early Paleozoic fishes through late Cenozoic mammals. Morphology, adaptations, relationships

of the major groups. Bone structures and systematic relationships. Field trip. Prerequisite: 100 or BIOL 101 or equivalent.

GEOL 438 Fossil Mammals (5) NW Rensberger Evolutionary relationships of fossil mammals, from mammal-like reptiles of late Paleozoic to diverse Cenozoic groups. Morphology, adaptations, extinctions, evolutionary patterns. Structures and relationships of most major groups. Field trip. Prerequisite: 100 or BIOL 101 or 437.

GEOL 443 Tectonics (3) NW Development of orogenic belts in space and time; critical evaluation of large-scale zones of deformation as geological expressions of plate interactions; characteristics of modern and ancient convergent plate boundaries. Prerequisite: 340.

GEOL 452 Principles of Sediment Transport by Turbulent Flow (3) NW Theoretical and experimental techniques used in studying erosion, transportation, and deposition of sediment. Initial motion of sediments, bed-load motion, suspension of sediment by turbulent flows, erosion and deposition of sediments, and applications of sediment transport theory to problems of geological interest. Prerequisite: 455. Offered: jointly with GPHYS 452/OCEAN 452.

GEOL 455 Introduction to Geomechanics (4) NW Basic principles of continuum mechanics, their application to flow of water, mud, magma; deformation of soil, rock, ice. Emphasis on sound physical understanding of these principles and use of elementary mathematics in their application to earth sciences problems. Prerequisites: MATH 126, PHYS 123, or equivalent.

GEOL 461 Stratigraphy (4) NW Bourgeois Systematic study of stratified rocks and space-time implications. Principles of stratigraphy, including biostratigraphy, magnetostratigraphy, seismic stratigraphy, subsurface analysis. Basin analysis, evolution of sedimentary basins and continental margins. Prerequisites: 306, 321, or equivalents. Offered: A.

GEOL 462 Depositional Environments (4) NW Bourgeois Principles of sedimentary facies analysis, including survey of modern processes that produce sedimentary sequences. Recognition of various depositional environments represented in the geologic record, including terrestrial, marine terrigenous, and carbonate environments. Two field trips required. Prerequisite: 306 or equivalent historical geology. Recommended: 311, 321. Offered: Sp.

GEOL 472 Introduction to Geochemistry (4) NW Nelson Thermodynamics; practical application of thermodynamic data to geologic problems. Crystal chemistry. Phase equilibria and phase diagrams. Aqueous geochemistry. Organic geochemistry. Systematics of radiometric dating. Stable isotope equilibria. Prerequisites: 320, 321, CHEM 150 or 155, or permission of instructor. Offered: A.

GEOL 474 Introduction to X-ray Crystallography (3) NW Ghose Point groups and space groups. Reciprocal lattice. Theory of x-ray diffraction from single crystals. Powder diffraction; identification of unknowns and determination of precise cell dimensions. Single crystal camera (precession and Weissenberg) techniques; determination of cell dimensions and space groups; study of exsolution and phase transformation in rock-forming silicates. Structure factor formula and the use of three-dimensional Fourier and Patterson series in the determination of crystal structures. Prerequisites: 320, PHYS 123.

GEOL 476 Isotope Geology (3) NW Stuiver Methods involving the application of radioactive isotopes in age dating (radiocarbon, ionium, potassium-argon dating), and of stable isotope variations in nature in determining the temperature history of the earth and igneous rock formations. Applications of global aspects of the hydrologic cycle, age dating in archaeol-

ogy, and geochemical cycling of elements. Prerequisite: background in introductory mathematics.

GEOL 477 Isotope Geology: Lithosphere (3) NW Nelson Radiogenic isotopes as petrogenetic indicators; isotopic evolution of earth's major geochemical reservoirs; application to problems in igneous, metamorphic, sedimentary petrology; stable isotope geothermometry; nucleosynthesis, origin and chronology of solar system formation; U-Th disequilibrium series; short-lived cosmogenic nuclides. Prerequisites: 320, 321, CHEM 150 or 155, or permission of instructor.

GEOL 485 Principles of Economic Geology (5) NW Cheney Principles of economic geology and exploration as illustrated by selected types of metallic and nonmetallic ore deposits and coal. Prerequisites: 321, 340, and senior standing in geological sciences.

GEOL 488 Economic Field Geology (5) NW Cheney Identification of hydrothermally altered rocks, oxidation, and supergene enrichment; principles of exploration, geochemistry and remote sensing. Four- to eight-day field trip to mining districts for field inspection of ore deposits. Two weekends (three days each) mapping mineral deposits. Prerequisites: 485 or equivalent and permission of instructor. Offered: Sp.

GEOL 490 Special Topics (2-10, max. 20) NW

GEOL 498 Undergraduate Thesis (5) NW The thesis must be submitted at least one month before graduation. Prerequisite: permission of department.

GEOL 499 Undergraduate Research (* max. 15) Prerequisite: permission of department.

Courses for Graduates Only

GEOL 509 Great Geological Issues (3) Bourgeois History and development of geological and paleontological theories and controversies; philosophy and methodology that have driven scientific inquiry in the earth sciences. Requires a term paper analyzing primary material. Prerequisites: 409 and graduate standing in earth sciences, or in history of science, or permission of instructor.

GEOL 511 Seminar in Geomorphology and Hydrology (* max. 3) Hallet, Porter Credit/no credit only. Prerequisite: graduate status and permission of instructor.

GEOL 512 Seminar in Quaternary Research (2) Porter Seminar with advanced readings and discussion stressing current problems in Quaternary research. Prerequisite: permission of instructor.

GEOL 518 Periglacial Geology (3) Hallet Geomorphic features and fundamental processes active in areas subjected to subfreezing temperatures. Geotechnical and environmental problems characteristic of periglacial areas. Prerequisites: 311 and prior or concurrent enrollment in 455. Recommended: CHEM 350.

GEOL 519 Advanced Geological Remote Sensing (4) Adams Critical examination of remote sensing methods that are used to determine chemistry, mineralogy, and structure of the earth's surface and the surfaces of solar system bodies. Photographic and digital multispectral imagery, reflectance spectroscopy, thermal infrared spectroscopy, gamma ray spectroscopy, radar imagery, and other techniques. Emphasis on the application of satellite and aircraft measurements to terrestrial geologic problems. Prerequisite: 410 or equivalent.

GEOL 520 Advanced Mineralogy (3) Ghose Crystal symmetry: point groups, space groups. Mathematical description of crystal structures; group theory, irreducible representations; tensor description of physical properties: stress, strain, piezoelectricity, elasticity; structural and magnetic phase transitions, Landau theory, deformation and creep crystals; elastol-

viscous properties of earth's mantle, crystal chemistry, solid state reactions. Offered: jointly with MSE 518.

GEOL 521 Metamorphic Minerals (5) Evans Structures, compositions, optical properties, stability, occurrence, and paragenetic associations of rock-forming metamorphic minerals. Significance of these observations in the determination of metamorphic environments. Laboratory study using the polarizing microscope. Prerequisite: 425 or equivalent. Offered: alternate years.

GEOL 524 Petrogenesis of Igneous Rocks (3) McCallum Origin of one or more of the major groups of igneous rocks. Selected petrogenetic problems in light of tectonic setting, petrography, geochemistry, and experimental studies. Prerequisite: 424 or equivalent. Offered: alternate years.

GEOL 525 Theoretical Metamorphic Petrology (4) Evans Theoretical treatment of metamorphic mineral assemblages and metamorphic processes. Prerequisites: 425, CHEM 456, or equivalent.

GEOL 526 Theoretical Igneous Petrology (4) McCallum Review of thermodynamics, with emphasis on solutions. Crystal-liquid equilibria. Physical properties of silicate melts. Oxidation states of magmas. Magmatic gases. Quantitative treatment of fractionation, assimilation, and magma mixing. Trace elements and isotope ratios. Stable isotopes as tracers. Nucleation and crystal growth. Diffusion in melts. Cooling and crystallization models. Elementary fluid dynamics applied to magma flow. Prerequisites: 424, CHEM 456, or equivalents. Offered: alternate years.

GEOL 527 Phase Equilibria in Silicate Systems (4) McCallum Phase equilibria in 1-, 2-, 3-, 4-, and multi-component systems appropriate to igneous rocks. Geometrical aspects stressed. Effect of H_2O , CO_2 , and variable oxidation states on phase equilibria. Application to the petrogenesis of common igneous rocks. Prerequisite: 424 or equivalent. Offered: alternate years.

GEOL 531 Seminar in Paleontology (2-4) Advanced topics in paleontology and biostratigraphy, including paleobiology and evolution.

GEOL 533 Seminar in Vertebrate Paleontology (3, max. 9) Rensberger Advanced topics in vertebrate evolution, morphology, classification, function, ecology, and stratigraphy. Subject to be chosen by class at beginning of quarter. Prerequisite: advanced standing in paleontology, vertebrate zoology, or biocultural anthropology.

GEOL 548 Tectonic Evolution of Western North America (4) Cowan Survey of each of the major Mesozoic and Cenozoic tectonic provinces in western North America, emphasizing structural styles, tectonic framework, and plate-tectonic setting. Provinces include: Laramide, Rocky Mountain thrust belt, Basin and Range, Cordilleran core complexes, San Andreas, Sierran-Klamath, Franciscan-Great Valley, Vancouver Island-San Juan Islands-North Cascades. Prerequisites: 340.

GEOL 549 Small-Scale Structures in Deformed Rocks (5) Cowan Origin, geometry, tectonic significance of small-scale structures, including foliation, lineations, folding and boudinage, brittle and ductile fault zones; qualitative strain analysis and principles of structural analysis. Includes work with deformed rocks in the field. Prerequisites: 340, 423.

GEOL 556 Planetary Surfaces (3) Comparison of surface processes and conditions on Mercury, Venus, Earth, moon, Mars, asteroids, and satellites of the great planets. Emphasis on understanding how and why planetary surfaces differ from one another and on the implied course of solar-system evolution. Analysis of data from Earth-based telescopes and from manned and unmanned space missions. Offered: jointly with ASTR 556/GPHYS 556; alternate years.

GEOL 557 Origin of the Solar System (3) Nebular and nonnebular theories of the origin of the solar system; collapse from the interstellar medium, grain growth in the solar nebula, formation of planetesimals and planets, early evolution of the planets and other possible planetary systems; examination of the physical and chemical evidence upon which the ideas concerning the origin of the solar system are based. Offered: jointly with ASTR 557/GPHYS 557.

GEOL 560 Mechanics of Erosion and Sediment Transport (3) Physics of transportation of sediment by turbulent flows. Use of theoretical fluid mechanics to formulate and solve problems of bed-load and suspended-load transport. Prerequisites: 455 or MATH 329, and 452. Offered: jointly with OCEAN 560.

GEOL 561 Seminar in Geological Fluid Mechanics (3) Reading and discussion of topics of current interest in geological fluid mechanics. Course work includes a report on a specialized topic. Prerequisite: permission of instructor. Offered: jointly with OCEAN 561.

GEOL 564 Sedimentology of Carbonate Rocks (2-4) *Bourgeois* Petrographic and environmental interpretation of carbonate sediments and rocks. Hand-specimen and thin-section studies, with references to modern and ancient carbonate environments. Offered: alternate years.

GEOL 565 Interpretation of Sedimentary Structures (2-4) Physical and environmental analysis of sedimentary structures, including biogenic sedimentary structures. Clastic sediments and rocks. Field trips required. Recommended: 452.

GEOL 571 Transport Theory and Applications in Geology (3) *Bergantz* Introduction to the quantitative treatment of transport phenomena with applications to igneous processes and metamorphism, magma and mantle convection, flow and reaction in regional and contact metamorphism. Emphasis on the governing equations of heat transfer, fluid and porous media flow, rheology, and analytical, numerical, and scaling solutions. Prerequisite: AMATH 402.

GEOL 572 Solution Geochemistry (4) *Ghiorsio* Solution chemistry and thermodynamics as applied to solid and liquid silicates and aqueous fluids. Modeling configurational entropies in solids, activity coefficients and complexes in aqueous solution, and modeling chemical mass transfer in geologic systems. Prerequisite: 472 or equivalent.

GEOL 573 Electron Beam Microanalysis (4) *Kuehner* Materials analysis using electron beams, including electron-target interactions, wave and energy dispersive x-ray analysis, scanning electron microscopy, and applications of these and related techniques to geological problems. Credit/no credit only.

GEOL 574 Advanced X-ray Crystallography (4) *Ghose* Theory of x-ray diffraction; determination of crystal structures with special emphasis on minerals and inorganic compounds, through the application of three-dimensional Patterson function, Fourier series, and direct methods; structure refinement; determination of cation distribution, exsolution, and antiphase domain structure through x-ray diffraction. Prerequisite: 474 or permission of instructor.

GEOL 575 Physics and Chemistry of the Earth's Interior (3) *Booker, Brown, Creager, Irving, Merrill* Emphasizes current issues in global tectonics and mantle dynamics. Examples include global seismic tomography and its bearing on geodynamics, the fate of subducted lithosphere and geochemical constraints on mantle convection. Prerequisite: permission of instructor. Offered: jointly with GPHYS 575.

GEOL 579 Magma Physics (3) *Bergantz* The quantitative treatment of magmatic processes: thermomechanical state of the lithosphere, solidification, convection, conjugate heat transfer, crystal settling, magma mixing, diapirism and melt extraction, hydro-

thermal convection. Emphasis on continental lithosphere. Prerequisites: 571, AMATH 403.

GEOL 582 Seminar in Sedimentology (2-4) *Bourgeois* Selected problems of current interest; extended field trips to classic sedimentologic localities.

GEOL 586 Economic Geology of Sedimentary Rocks (5) *Cheney* Description and origin of metallic and nonmetallic ore deposits indigenous to regoliths, sediments, and sedimentary rocks. Prerequisite: 485 or equivalent or permission of instructor. Offered: alternate years.

GEOL 587 Economic Geology of Igneous and Metamorphic Rocks (5) *Cheney* Description and origin of metallic and nonmetallic ore deposits formed in igneous and metamorphic rocks or by igneous and metamorphic processes. Prerequisite: 485 or equivalent or permission of instructor. Offered: alternate years.

GEOL 590 Special Topics (2-10, max. 20)

GEOL 600 Independent Study or Research (*) Credit/no credit only.

GEOL 700 Master's Thesis (*)

GEOL 800 Doctoral Dissertation (*)

Geophysics

202 Atmospheric Sciences-Geophysics

Geophysics is an interdisciplinary physical science concerned with the makeup, behavior, and planetary environment of the earth. The techniques of physics, mathematics, and chemistry are applied to the structure and dynamic behavior of the earth and other planets. Included in this interdisciplinary area are a large number of complex and interrelated natural processes ranging from processes in the earth's core to processes in the atmosphere and magnetosphere. An undergraduate degree is not offered.

Graduate Program

The Geophysics Program offers graduate study leading to the Master of Science and Doctor of Philosophy degrees. These degrees cover a broad range of topics in which the analytic techniques of physics and mathematics are brought to bear on problems of the earth and its environment. Major areas of interest are the internal and surface structures of planets, dynamical processes within the earth, oceans, and atmosphere, the associated environmental applications of these processes, and the interactions of the earth, ice, ocean, and atmosphere in the climate system.

The required curriculum is flexible so as to permit pursuit of the wide variety of scientific disciplines that may be necessary for approaching a specific geophysical problem. However, a core curriculum of basic physics and mathematics and a sequence of courses dealing with some of the important problems encountered in space, the atmosphere, the oceans, and the solid earth are required. Additional specialized course work necessary before a student embarks on a thesis project is identified by the student and a faculty committee.

Special Requirements

Qualification for the Ph.D. program is a process that considers course and research performance together with the result of an oral exam that is based on a research proposition and is normally given to students at the beginning of their second year. Students who do not qualify for the Ph.D. program by means of this process may be reconsidered following completion of an M.S. program.

Financial Aid

Most financial aid is provided through graduate research assistantships that enable students to work with individual faculty members on research projects. However, two teaching assistantships also are awarded each year.

Research Facilities

Research facilities include field equipment for electromagnetic induction studies; a high-pressure/temperature laboratory, including x-ray machine, ruby fluorescence pressure measuring system, laser-induced phonon spectrometer and diamond anvil cells for studying such rock and mineral properties as compression, sound velocities, and thermal conductivity; a permanent statewide seismic network; a portable telemetered seismic network for studying volcanoes and active faults in western North America; geodetic quality global positioning system receivers; a cold laboratory for studying problems in snow-cover geophysics, glaciology, and sea-ice research; a geophysical fluids laboratory; a space physics laboratory for preparing balloon, rocket, and satellite experiments; and a laboratory for the development of high-resolution optical instrumentation. Computer facilities include a local area network linking a high speed, large storage server with various laboratory workstations and peripheral devices via ethernet. This local net is connected to a campus-wide fiber-optic ring that provides access to other campus computers and national networks. Many of the geophysics faculty members also have laboratories or access to laboratories in other departments, thus making possible a wide diversity of research opportunities. This is particularly valuable in such fields as aeronomy, tropospheric aerosols, radioactive age dating, and geophysical fluid mechanics. In addition to laboratory work, field programs are carried out at a number of remote sites, particularly in the Washington Cascades and Olympics, and Antarctica. In marine geophysics, joint geophysics/oceanography projects provide opportunities for studying the earth's structure and tectonic processes on the sea floor. Facilities for reflection profiling, long-range seismic refraction, and magnetic and paleomagnetic measurements are available.

Correspondence and Information

Chair, Geophysics Program
202 Atmospheric Sciences-Geophysics, Box 351650

Faculty

Chair

John R. Booker

Professors

Baker, Marcia * 1980; MS, 1960, Stanford University; PhD, 1971, University of Washington; cloud physics, atmospheric geophysics.

Booker, John R. * 1971; PhD, 1968, University of California (San Diego); geomagnetic induction, magnetotellurics, inverse theory, geophysical fluid dynamics.

Brown, J. Michael * 1984; PhD, 1980, University of Minnesota; experimental and theoretical mineral and rock physics.

Businger, Joost A. * 1958, (Emeritus); PhD, 1954, University of Utrecht (Netherlands); boundary layer meteorology, atmosphere-ocean interaction.

Charlson, Robert J. * 1965; PhD, 1964, University of Washington; atmospheric chemistry, aerosol physics, aerosol/cloud/climate interaction.

Clark, Kenneth C. * 1948, (Emeritus); PhD, 1947, Harvard University; optical spectroscopy, upper atmosphere.

Criminale, William O. * 1968; PhD, 1960, Johns Hopkins University; fluid dynamics, mathematical physics, nonlinear mechanics, stability theory.

Crosson, Robert S. * 1966; PhD, 1966, Stanford University; seismology, structure and tectonics, earthquake hazards.

Ghose, Subrata * 1972, (Adjunct); PhD, 1959, University of Chicago; mineralogy.

Hernandez, Gonzalo * 1988, (Research); PhD, 1962, University of Rochester; optical interference phenomena, with application to remote sensing of atmospheres.

Hobbs, Peter V. * 1963, (Adjunct); PhD, 1963, University of London; Imperial College; aerosol/ cloud/precipitation physics, atmospheric chemistry, air pollution, mesoscale meteorology.

Holzworth, Robert * 1982; PhD, 1977, University of California (Berkeley); experimental space plasma physics, atmospheric/magnetospheric electric fields, thunderstorms.

Leovy, Conway B. * 1967; PhD, 1964, Massachusetts Institute of Technology; planetary atmospheres, middle atmosphere meteorology, remote sensing.

Lewis, Brian T. * 1970; PhD, 1970, University of Wisconsin; marine geophysics, marine seismology, gravity, magnetics, and computer modeling of those processes.

Maione, Stephen * 1972, (Research); PhD, 1972, University of Nevada; seismicity of Cascade volcanoes and eastern Washington, computers in seismic network analysis.

Maykut, Gary * 1969, (Research); PhD, 1969, University of Washington; polar air-sea-ice interaction, radiative transfer in ice and snow.

Merrill, Ronald T. * 1967; PhD, 1967, University of California (Berkeley); geomagnetism, geophysics of solids, rock magnetism.

Parks, George K. * 1971; PhD, 1966, University of California (Berkeley); particles and waves in auroral, magnetospheric, and interplanetary space plasma phenomena.

Raymond, Charles F. * 1969; PhD, 1969, California Institute of Technology; glaciology, glacier and ice sheet dynamics.

Smith, Stewart W. * 1970, (Emeritus); PhD, 1961, California Institute of Technology; seismology, earthquake risk, seismotectonics.

Untersteiner, Norbert * 1962; PhD, 1950, University of Innsbruck (Austria); air-sea-ice interaction, polar climatology, sea ice physics.

Warren, Stephen G. * 1981; PhD, 1973, Harvard University; atmospheric radiation, climatology, glaciology.

Associate Professors

Creager, Kenneth C. * 1986; PhD, 1984, University of California (San Diego); global seismology and geophysical inverse theory.

Harrison, Halstead * 1971, (Adjunct); PhD, 1960, Stanford University; atmospheric chemistry, dispersion modeling, radiative transfer.

Jay, David A. * 1983, (Research); PhD, 1987, University of Washington; wave processes, sediment transport and physical oceanography of coastal waters.

McCarthy, Michael P. 1989, (Research); PhD, 1988, University of Washington; magnetospheric and space plasma physics.

Mercer, James A. * 1968, (Research); PhD, 1983, University of Washington; ocean acoustic tomography, global climate measurements, and ocean dynamic modeling.

Qamar, Anthony * 1983, (Research); PhD, 1971, University of California (Berkeley); earthquakes associ-

ated with volcanoes and glaciers, earth-structure and earthquake hazards.

Waddington, Edwin D. * 1984, (Research); PhD, 1981, University of British Columbia (Canada); glacier and ice sheet modeling, interpretation of ice sheet stratigraphy.

Assistant Professors

Conway, Howard B. * 1987, (Research); PhD, 1986, University of Canterbury (New Zealand); glaciology with emphasis on physical process in snow and ice.

DeCosmo, Janice M. 1994, (Research); PhD, 1991, University of Washington.

Odom, Robert I. 1993, (Research); PhD, 1980, University of Washington.

Sahr, John D. * 1991, (Adjunct); PhD, 1990, Cornell University; radar remote sensing, ionospheric physics; signal processing; wireless communications.

Unsworth, Martyn J. * 1993, (Research); PhD, 1991, Cambridge University (UK); geomagnetic induction, magnetotellurics, electromagnetic geophysics.

Wilcock, William S. D. 1993, (Adjunct); PhD, 1992, Massachusetts Institute of Technology; marine seismology, dynamics of mid-ocean ridges, geological fluid dynamics.

Winglee, Robert M. * 1991; PhD, 1984, University of Sydney (Australia); energetic phenomena in sun/earth plasmas, excitation of waves, high energy particle acceleration.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

GPYS 401 Geophysical Continuum Mechanics (3) NW Analysis of stress and strain. Measurement and interpretation of strain in geological materials. Elasticity applied to determine stress in the earth's lithosphere. Creep of solids and flow of geological materials. Prerequisites: MATH 307 and 308 or equivalent. Offered: A.

GPYS 402 Seismology (3) NW Introduction to theoretical and observational seismology. Elastic plane wave propagation through stratified media. Surface waves, eigenvibrations, ray theory. Structure of the Earth's mantle and core. Seismicity distributions, earthquake focal mechanisms and relationship to tectonics. Prerequisite: 401 or permission of instructor. Recommended: concurrent registration in 432. Offered: W.

GPYS 403 Geophysics: The Earth (3) NW The earth and its interior: gravity, magnetism, heat flow, seismology. Earth's outer structure, studied through the unifying concepts of plate tectonic theory. Quantitative approaches to problems, using techniques of classical physics. Prerequisites: 402 and PHYS 322 or permission of instructor. Offered: Sp.

GPYS 404 Geophysics: Fluids (3) NW Introduction to geophysical fluid dynamics. An overview of fluids in geophysics with emphasis on the oceans. A nonrigorous development of the equations of motion with examples drawn from oceanography and solid earth geophysics. Prerequisites: MATH 307 and 308 or equivalent and PHYS 323 or permission of instructor. Offered: A.

GPYS 405 Space and Plasmas (3) NW Survey of various phenomena occurring in outer regions of Earth's atmosphere, ionosphere, magnetosphere, and Van Allen radiation belts. Laboratory applications include plasma thrusters and fusion. Concepts include charged particles in magnetic fields, drift motion, plasma, magnetohydrodynamic waves. Prerequisite:

PHYS 321 or equivalent or permission of instructor. Offered: jointly with A A 405; W.

GPYS 406 Geophysics: The Atmosphere (3) NW Phenomena of the lower atmosphere: some simple applications of the principles of classical thermodynamics, fluid dynamics, and radiative transfer to the atmospheric hydrological cycle, global energy balance, and atmospheric dynamics and climate. Prerequisite: 404 or permission of instructor. Offered: jointly with ATM S 406; Sp.

GPYS 415 Principles of Glaciology (3) NW Hallet, Maykut, Porter, Raymond, Stuiver, Warren Snow deposition and metamorphism, avalanches, heat and mass balance at snow and ice surfaces, glacier flow and erosion, ice sheets, sea ice, frozen ground, methods of paleoclimate reconstruction, ice age theories. Prerequisite: permission of instructor. Offered: jointly with GEOL 415; A.

GPYS 425 NASA Science and Engineering Research Seminar (1, max. 4) NW DeCosmo Review of current space science-related research. Emphasis varies, but topics may include global change, the solar system, aeronautical engineering, and remote sensing. Credit/no credit only. Offered: Sp.

GPYS 431 Seismology and Earthquake Engineering (3) NW Evans, S. Smith Overview of earthquake processes and details of the characteristics of destructive ground motion; effects of such motion on engineering structures; current practice in estimating earthquake hazards for important structures such as nuclear power plants. Prerequisite: MATH 307 and 308 or permission of instructor. Offered: jointly with CIVE 431; A.

GPYS 432 Applied Seismology (2) NW Interpretation methods in seismology. Seismogram interpretation, including body and surface waves. Seismic instrumentation. Earthquake location, magnitude, and fault-plane solutions. Seismic reflection and refraction methods. Measurement and interpretation of strong ground motion near the epicenter of large earthquakes. Prerequisite: concurrent registration in 402, or permission of instructor. Offered: W.

GPYS 435 Seismic Exploration (5) NW Brown Introduction to theory and practice of seismic exploration. Application of refraction and reflection techniques to problems in engineering geology and mineral exploration. Constraints in the interpretation of subsurface structure. Prerequisites: MATH 126, PHYS 123, GEOL 340. Offered: jointly with GEOL 435; Sp.

GPYS 452 Principles of Sediment Transport by Turbulent Flow (3) NW Theoretical and experimental techniques in studying erosion, transportation, and deposition of sediment. Initial motion of sediments, bed-load motion, suspension of sediment by turbulent flows, erosion and deposition of sediments, applications of sediment transport theory to problems of geological interest. Prerequisite: 455. Offered: jointly with GEOL 452/OCEAN 452; Sp.

GPYS 480 Special Topics in Geophysics (2-6, max. 12) NW Intensive treatment of a selected geophysical topic presented through faculty lectures, guest lectures, and student reports. For students in geophysics and related fields. Subject varies from year to year. Prerequisite: permission of instructor. Offered: S.

GPYS 499 Independent Study for Undergraduates (1-5, max. 10) Prerequisite: permission of instructor. Offered: A/W/Sp.

Courses for Graduates Only

GPYS 501 Geophysical Continuum Mechanics (3) Analysis of stress and strain. Measurement and interpretation of strain in geological materials. Elasticity applied to determine stress in the earth's lithosphere. Creep of solids and flow of geological materials. Includes advanced, research-oriented problems. Pre-

requisites: MATH 307 and 308 or equivalent. Offered: A.

GPYS 502 Seismology (3) Theoretical and observational seismology. Elastic plane wave propagation through stratified media. Surface waves, eigenvibrations, ray theory. Structure of Earth's mantle and core. Seismicity distributions, earthquake focal mechanisms and relationship to tectonics. Advanced, research-oriented problems. Prerequisite: 501. Recommended: concurrent registration in 432. Offered: W.

GPYS 503 Geophysics: The Earth (3) Study of gravity, magnetism, heat flow, seismology. Earth's outer structure studied through unifying concepts of plate tectonic theory. Quantitative approaches to problems, using techniques of classical physics. Includes advanced, research-oriented problems. Prerequisites: 502 and PHYS 322. Offered: Sp.

GPYS 504 Geophysics: Fluids (3) Geophysical fluid dynamics. Fluids in geophysics with emphasis on the oceans. Development of the equations of motion with examples drawn from oceanography and solid earth geophysics. Includes advanced, research-oriented problems. Prerequisites: PHYS 323, MATH 307 and 308 or equivalent. Offered: A.

GPYS 505 Geophysics: Space (3) Various phenomena occurring in outer regions of Earth's atmosphere, ionosphere, magnetosphere, and Van Allen radiation belts. Laboratory applications include plasma thrusters and fusion. Concepts include charged particles in magnetic fields, drift motion, plasma, magnetohydrodynamic waves. Includes advanced, research-oriented problems. Prerequisite: PHYS 321 or equivalent. Offered: W.

GPYS 506 Geophysics: The Atmosphere (3) Phenomena of the lower atmosphere: some simple applications of the principles of classical thermodynamics, fluid dynamics, and radiative transfer to the atmospheric hydrological cycle, global energy balance, and atmospheric dynamics and climate. Includes advanced, research-oriented problems. Prerequisite: 504. Offered: Sp.

GPYS 508 Geochemical Cycles (4) Descriptive and quantitative aspects of the earth as a biogeochemical system. Fundamental methods for study of equilibria, transport processes, chemical kinetics and biological processes and their application to the carbon, sulfur, nitrogen, phosphorus, and other elemental cycles. Stability of biogeochemical systems and the nature of human perturbations of their dynamics. Prerequisites: CHEM 150, 350, MATH 307 and 308. Offered: jointly with ATM S 508; Sp.

GPYS 510 Physics of Ice (3) *Raymond* Structure of the water molecule. Crystallographic structures of ice. Electrical, optical, thermal, and mechanical properties of ice. Growth of ice from the vapor and liquid phases. Physical properties of snow. Prerequisite: permission of instructor. Offered: jointly with ATM S 510; odd years; W.

GPYS 511 Formation of Snow and Ice Masses (3) *Warren* Snow and ice climatology. Formation of the ice crystals in clouds. Snow metamorphism. Transfer of radiative, sensible, and latent heat at snow and ice surfaces. Remote sensing of snow and ice. Growth and melt of sea ice. Climatic records from ice. Prerequisite: permission of instructor. Offered: jointly with ATM S 511; alternate years; A.

GPYS 512 Dynamics of Snow and Ice Masses (3) *Raymond* Rheology of snow and ice. Sliding and processes at glacier beds. Thermal regime and motion of seasonal snow, glaciers, and ice sheets. Avalanches and glacier surges. Deformation and drift of sea ice. Response of natural ice masses to change in climate. Prerequisite: permission of instructor. Offered: jointly with ATM S 512; odd years; Sp.

GPYS 513 Structural Glaciology (3) *Raymond* Physical and chemical processes of snow stratigraphy

and metamorphism. Interpretation of ice sheet stratigraphy in terms of paleoenvironment. Dynamic metamorphism from ice flow. Structures formed at freezing interfaces. Structure of river, lake, and sea ice. Relationship between structures and bulk physical properties. Prerequisite: permission of instructor. Offered: jointly with ATM S 513; even years; W.

GPYS 514 Ice and Climate Modeling (3) *Warren* Principles of global climate modeling. Modeling seasonal cycles of snow cover and sea ice. Ice-sheet mass balance and flow. Solar radiation anomalies due to changes in earth's orbit. Climate/ice-sheet models of Pleistocene ice ages. Prerequisite: permission of instructor. Offered: jointly with ATM S 514; alternate years; A.

GPYS 518 Introduction to Geophysical Research (1-2, max. 4) Introduces research of faculty and advanced graduate students to first-year graduate students and provides experience for the formulation, oral presentation, and defense of research proposals and results. Offered: AWSp.

GPYS 519 Geophysical Research Methods (2, max. 12) Current research methodology and results based on recent literature and on faculty and student research. Designed to develop student perspective on observational and theoretical methods and on relation of specific research to broader developments in geophysics and interdisciplinary aspects of geophysics through faculty-guided presentations and discussion by students. Offered: A, W, Sp.

GPYS 520 Seminar (1, max. 15) Review of current literature in geophysics and graduate student research with faculty participation. Credit/no credit only. Offered: AWSp.

GPYS 522 Atmospheric Electrical Dynamics (3) *Holzworth* Global and local dynamical electric field models, including upper atmospheric and tropospheric sources as modified by propagation delays, orographic features, and transient phenomena. Radiation and plasma waves along with microphysics of corona discharge and charge separation mechanisms. Prerequisites: 406 and 405, or permission of instructor. Offered: A.

GPYS 523 Introduction to Solar-Terrestrial Physics (3) *Holzworth* Introduces the student to several areas of space physics, the physical principles that apply therein, and the methods by which significant observations are made. Covers electromagnetic and plasma processes from the center of the sun to the surface of the earth. Prerequisites: PHYS 321, 322, 323 or permission of instructor. Offered: Sp.

GPYS 532 Atmospheric Radiation: Shortwave (3) *Warren* Principles of radiative transfer in planetary atmospheres with emphasis on single and multiple scattering of visible and infrared radiation. Applications to atmospheric and surface energy balance and remote sensing. Prerequisite: PHYS 323 or permission of instructor. Offered: jointly with ATM S 532; alternate years; W.

GPYS 533 Atmospheric Radiation: Longwave (3) *Leovy, Warren* Principles of radiative energy exchange in planetary atmospheres with emphasis on emission and absorption of infrared and microwave radiation. Applications to atmospheric and surface energy balance and remote sensing. Prerequisite: PHYS 225 or permission of instructor. Offered: jointly with ATM S 533; Sp.

GPYS 534 Remote Sensing of the Atmosphere and Climate System (3) *Katsaros, Leovy, Warren* Satellite systems for sensing the atmosphere and climate system. Recovery of atmospheric and surface information from satellite radiance measurements. Applications for research. Prerequisites: 532 and 533. Offered: jointly with ATM S 534; Sp.

GPYS 535 Cloud Microphysics and Dynamics (3) *Baker, Hobbs* Basic concepts of cloud micro-

physics, water continuity in clouds, cloud dynamics, and cloud models. Prerequisite: ATM S 501 or permission of instructor. Offered: jointly with ATM S 535; W.

GPYS 537 Space and Laboratory Plasma Physics (3) *Parks* Discussion of waves, equilibrium and stability, diffusion and resistivity, basic plasma kinetic theory, and wave-particle interactions. Prerequisite: 405 or equivalent or permission of instructor. Offered: jointly with A A 556; Sp.

GPYS 538 Advanced Space Plasma Physics (3) *Parks* Formation by the interaction of solar wind with geomagnetic field. Trapped particles. Electromagnetic waves in anisotropic plasma. Dynamic disturbances and plasma instabilities. Prerequisite: 405 or permission of instructor. Offered: A.

GPYS 539 Kinetic Theory and Simulation of Space Plasmas (3) *Winglee* Wave-particle interactions in space plasmas. Generation of different wave modes, electrostatic and electromagnetic, Langmuir waves to Alfvén waves. Beam, Weibel, and maser instabilities, heavy ion interactions. Particle simulations, electrostatic and electromagnetic, for non-linear wave evolution and particle heating. Offered: W.

GPYS 540 Observational Seismology (1, max. 18) *Creager, Crosson, Malone, Qamar* Quarterly research themes introduce students to a variety of digital and analog seismograms and techniques for their interpretation. Students present results of short investigations in an informal seminar setting. Credit/no credit only. Prerequisite: 402 or permission of instructor. Offered: AWSp.

GPYS 541, 542 Theoretical Seismology I, II (3, 3) *Creager, Crosson, Smith* Advanced theoretical seismology. Attenuation and physical dispersion. Waves in anisotropic media. Moment-tensor source representation. Lamb's problem. Waves in stratified media: propagator methods, asymptotic ray theory, WKBJ seismograms. Inverse methods and analysis of seismological data. Prerequisites: 401, 402, and PHYS 424, or permission of instructor for 541; 541 for 542. Offered: even years; Sp, A.

GPYS 543 Low-Frequency Seismology (3) *Creager* Represent seismic displacement field, including surface and body waves, as superposition of normal modes. Rigorous development of equations of motion, their solution, energy integrals, Rayleigh's Principle, perturbation theory, attenuation, and excitation formulae. Moment-tensor representation of seismic sources. Prerequisites: 401, 402, and PHYS 424 or permission of instructor. Offered: odd years; Sp.

GPYS 555 Planetary Atmospheres (3) *Leovy* Problems of origin, evolution, and structure of planetary atmospheres, emphasizing elements common to all planetary atmospheres; roles of radiation, chemistry, and dynamical processes; new results on the atmospheres of Venus, Mars, Jupiter, and other solar-system objects in the context of comparative planetology. Offered: jointly with ASTR 555/ATM S 555; even years; A.

GPYS 556 Planetary Surfaces (3) *Adams* Comparison of surface processes and conditions on Mercury, Venus, Earth, moon, Mars, asteroids, and satellites of the great planets. Emphasis on understanding how and why planetary surfaces differ from one another and the implied course of solar-system evolution. Analysis of data from earth-based telescopes and manned and unmanned space missions. Offered: jointly with ASTR 556/GEOL 556; odd years; Sp.

GPYS 557 Origin of the Solar System (3) *Brownlee* Nebular and nonnebular theories of solar system origin; collapse from the interstellar medium, grain growth in the solar nebula, formation of planetesimals and planets, early evolution of the planets and other possible planetary systems; the physical and chemical evidence upon which the ideas concerning

the origin of the solar system are based. Offered: jointly with ASTR 557/GEOL 557; W.

GP HYS 561, 562 Computational Methods and Modeling in Geophysics I, II (3, 3) *Winglee* Solution of complex dispersion equations including multiple root finding. Data analysis, fitting, smoothing, fast integration. Ray tracing and particle tracking in 2-D and 3-D. Computer simulation of fluid interactions, unmagnetized and magnetized, compressible and incompressible, and flow around objects. Offered: W, Sp.

GP HYS 563 Geophysical Data Collection and Analysis (3) *Crosson* Theory and practical application of data collection and analysis applied to geophysical problems. Digital processing of signals; filtering and spectral analysis. Laboratory sessions include problem solving on computer-based processing system. Offered: A.

GP HYS 564 Geophysical Inverse Theory (3) *Booker* Introduction to the mathematical techniques for estimating properties of physical systems, such as the earth or atmosphere, from data that is insufficient for a precise specification of the system. Emphasis is on the concept of the resolving power of data sets. The ideas developed are quite general and have a wide range of applicability in the field of data interpretation. Prerequisites: 563 and permission of instructor. Offered: odd years; Sp.

GP HYS 571 Geodynamics (3) Advanced study of various aspects of the dynamics of the solid Earth. Topics may include plate tectonics, mantle convection, rotational dynamics, post-glacial rebound, fault mechanics, and geodetic measurement of crustal deformation. Offered: odd years; A.

GP HYS 572 Geomagnetism (3) *Merrill* Advanced aspects of earth magnetism intended for specialists in this field. Extensive discussion of origin theories and their implications; physical basis and theories of magnetism in rocks; paleomagnetic techniques and results. Prerequisite: permission of instructor. Offered: even years.

GP HYS 573 Mineral Physics (3) *Brown, Merrill* Applications of solid-state physics to various geophysical problems. Topics vary, but usually include the thermal properties of relevant geophysical materials, the equation of state for the earth's mantle and core, defects in solids and their roles in tectonophysics. Prerequisite: permission of instructor. Offered: alternate years; W.

GP HYS 574 Electromagnetic and Potential Field Methods (3) Development of equations of electromagnetic fields in conducting media. Solution of forward and inverse problems with natural and controlled sources: magnetotelluric and related methods. Includes the special case of static fields: DC resistivity, gravity, and magnetic interpretation. Prerequisites: 403 or 503, 563 and PHYS 323 or permission of instructor. Offered: even years W.

GP HYS 575 Physics and Chemistry of the Earth's Interior (3) *Brown, Creager, Irving, Merrill* Emphasizes current issues in global tectonics and mantle dynamics. Examples include global seismic tomography and its bearing on geodynamics, the fate of subducted lithosphere and geochemical constraints on mantle convection. Prerequisite: permission of instructor. Offered: jointly with GEOL 575; A.

GP HYS 580 Special Topics in Geophysics (2-6, max. 12) Intensive treatment of a selected topic in geophysics presented by lectures or seminars for students in geophysics and related special fields. Subject is selected from all areas in geophysics and varies from year to year. Prerequisite: permission of instructor. Offered: AWSp.

GP HYS 600 Independent Study or Research (*) Offered: AWSpS.

GP HYS 700 Master's Thesis (*) Offered: AWSpS.

GP HYS 800 Doctoral Dissertation (*) Offered: AWSpS.

Germanics

340C Denny

The Department of Germanics is concerned with the language, literature, and civilization of the German-speaking countries, with the role of their history, literature, and philosophy in Western civilization, and with linguistic analysis, especially historic, of the Germanic languages. The department offers several courses conducted in English on well-known authors and topics, designed especially for the nonmajor.

Undergraduate Program

Adviser
Hellmut Ammerlahn
331 Denny

Bachelor of Arts

Major Requirements

German Language and Literature: 53 credits: (1) 15 credits to include: 311; 312; 322 or 323; (2) 15 credits from the group 411, 412, 421, 422, or 423; (3) one course from 333, 334, 401, 403; (4) 20 credits in upper-division Germanics (which may include 210, but not more than 4 credits of 395 and/or 396). Specialization in linguistics: Students must take 451 and 452 as part of the 53 credits and may, with the adviser's permission, count relevant courses outside Germanics among electives.

German Area Studies: 50 credits: (1) 15 credits to include 322; 323; 311 or 312; (2) 15 credits from the group 210, 411, 412, 421, 422, 423; (3) 20 credits in upper-division Germanics and/or, with the permission of the adviser, courses relevant to German culture and civilization offered by other departments. Not more than 4 credits of 395 and/or 396 may be counted.

For both options above, a grade of at least 2.0 must be earned in every upper-division German course; a 2.50 GPA must be maintained in these courses.

Minor

Minor Requirements

Minimum 30 credits from one of the following three areas:

Area Studies: GERMAN 322 and 323; 311 or 312; at least one 300-level Germanics course offered in English (210 also accepted); at least 10 upper-division elective credits in Germanics or other related courses.

Language and Literature: GERMAN 311 and 312; 322 or 323; at least one upper-division language course beyond 302; at least 12 elective credits in upper-division Germanics courses.

Linguistics: GERMAN 451 and 452; at least two courses beyond 302 in the language series; one course from 311, 312, 322, or 323; at least 9 upper-division elective credits in Germanics or other departments offering linguistics.

Graduate Program

Jane K. Brown, Graduate Program Coordinator

The Department of Germanics offers a closely integrated program leading to the Master of Arts and to the Doctor of Philosophy degrees. The doctoral curriculum serves the needs of the future professors at universities

and colleges, stressing scholarship and research. The master's curriculum requires a minimum of 40 credits, a final comprehensive examination, and a master's thesis or two papers. The study period of the doctoral program is two years (minimum number of post-master's credits is 60). The completion of the necessary course work is followed by general written and oral examinations. A third doctoral year is reserved for the writing of the dissertation.

The M.A. and Ph.D. programs concentrate on German literature, civilization, and philosophical traditions, with an option to include Germanic linguistics and courses outside the department. The doctoral dissertation must be an original contribution to scholarship and must demonstrate mastery of the pertinent methods of investigation.

The Department of Germanics also participates in the joint-doctoral program in literature and critical theory. Study in this program leads to a Ph.D. in Germanics and Critical Theory. For details see the program description under Comparative Literature.

Special Requirements

Aspirants for advanced degrees in German must have the equivalent of an undergraduate major in German. A reading knowledge of one foreign language (usually German) is a prerequisite for the M.A. degree. Reading knowledge of a second language is required before the student is admitted to the Ph.D. General Examination. The languages chosen are subject to approval by the department.

Financial Aid

A limited number of teaching assistantships are available. The teaching load consists of a five-hour course on the first- or second-year level. The teaching assistants are supervised by experienced faculty members.

Correspondence and Information

Graduate Program Coordinator
340C Denny, Box 353130

Faculty

Chair

Richard T. Gray

Professors

Behler, Diana I. * 1971; MA, 1966, PhD, 1970, University of Washington; romanticism, nineteenth century, comparative literature.

Behler, Ernst H. * 1965; PhD, 1951, University of Munich (Germany); romanticism, literary theory, history of criticism.

Brown, Jane K. * 1988; PhD, 1971, Yale University; seventeenth, eighteenth and nineteenth century, comparative literature.

Gray, Richard T. * 1991; PhD, 1981, University of Virginia; eighteenth, nineteenth and early twentieth-century literature, literary sociology, critical theory.

Hertling, Gunter H. * 1961; PhD, 1963, University of California (Berkeley); eighteenth- and nineteenth-century literature.

Hruby, Antonin F. * 1961, (Emeritus); PhD, 1946, Charles University (Czechoslovakia); medieval literature, comparative literature.

Jaeger, C. Stephen * 1985; PhD, 1970, University of California (Berkeley); medieval German and Latin literature, medieval intellectual history, comparative literature.

Ray, William H. 1950, (Emeritus); PhD, 1937, University of Frankfurt (Germany); nineteenth and twentieth century German literature.

Voyles, Joseph B. * 1965; PhD, 1965, Indiana University; Germanics and linguistics.

Associate Professors

Ammerlahn, Hellmut H. * 1968; MA, 1960, University of Vermont; PhD, 1965, University of Texas (Austin); Goethe, eighteenth to early twentieth century, comparative literature.

Bansleben, Manfred * 1988; PhD, 1979, University of Vienna (Austria); German language and methodology, history, culture studies.

Barrack, Charles M. * 1968; MA, 1966, PhD, 1969, University of Washington; Germanic linguistics.

McLean, Sammy K. * 1967, (Emeritus); PhD, 1963, University of Michigan; Western drama, twentieth-century poetry, psychoanalysis and literature, translation.

Rabura, Horst M. * 1961, (Emeritus); MA, 1966, University of Washington; German language and methodology.

Sauerlander, Anne M. 1971, (Emeritus); MA, 1930, State University of New York (Buffalo); PhD, 1936, Cornell University; Germanics.

Wilke, Sabine * 1988; PhD, 1986, University of Mainz (Germany); critical theory, contemporary theater and film, literature and philosophy.

Assistant Professors

Ostmeier, Dorothee 1993; PhD, 1993, Johns Hopkins University; eighteenth and twentieth century literature and philosophy, critical theory, German studies.

Pruttl, Brigitte * 1991; DPhil, 1988, University of Graz; eighteenth-century literature, twentieth-century Austrian literature, theory and history of drama.

Wiedmer, Caroline 1993; PhD, 1994, Princeton University; German and Swiss literatures of the twentieth-century, Holocaust, film, cultural studies.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

Lists of names under various literature courses indicate the kind of material covered but are neither comprehensive nor exclusive of other significant figures. Detailed descriptions of courses are published by the Department of Germanics prior to registration each quarter.

GERMAN 100 Intensive First-Year German (15) Accelerated first-year German. Speaking and listening. Secondary objectives are reading and writing. Offered: S.

GERMAN 101, 102, 103 First-Year German (5, 5, 5) The methods and objectives are primarily audiolingual, with emphasis on speaking and listening. Secondary objectives are reading and writing. (See credit note following 104.) Offered: AWS, AWSp, AWSPs.

GERMAN 104 Individualized First-Year German (1-15) Individualized approach to elementary German instruction. Students progress at their own pace. Credits vary. Depending upon amount of material mastered, any number of credits up to 15 may be earned per quarter. Credit/no credit only.

Credit Restrictions: Students may receive credit for only one course in each of the following: 101, 111, and the first 5 credits of 104; 102, 111, and the second 5 credits of 104; 103 and the last 5 credits of 104. They may, however, receive credit for courses in different first-year sequences if the courses are taken in progressively more advanced order (e.g., the first 5 credits of 104 followed by 102 and 103). 100 is the equivalent of 101, 102, 103, or 15 credits of 104.

GERMAN 111 Basic German Review (5) Combines in one quarter the contents of 101 and 102. Designed for students with background in German who however feel unprepared to take 102. Highly motivated beginners are also encouraged to take the course. Offered: A.

GERMAN 121, 122 First-Year Reading German (5, 5) Special beginning course devoted exclusively to the reading objective; 122 continuation of 121. Offered: AS, WS.

GERMAN 150 Conversational German Through Films (2, max. 6) Conversational practice in small groups based on films. Because series progresses through the year, beginners may enroll only Autumn Quarter. May be taken concurrently with other Germanics courses. Cannot be taken for credit if 250 previously taken. Offered: AWSp.

GERMAN 200 Intensive Second-Year German (15) VLP Accelerated second-year German. Systematic review of German grammar. Intensive practice in conversation, reading and writing. Prerequisite: 103 or equivalent. Offered: S.

GERMAN 201, 202, 203 Second-Year German (5, 5, 5) VLP Systematic review of German grammar. Intensive practice in conversation, reading, and writing. Prerequisites: 103 for 201; 201 for 202; 202 for 203; or equivalent. Offered: AWSp, AWSp, AWSp.

GERMAN 221 The German Express: Second Year (10) VLP Intensive version of 201 and 202. Stresses development of reading and speaking skills. Limited to students who have demonstrated exceptional skills in first year German. Offered: A.

GERMAN 230 Conversational German (5) VLP Intensive conversational German. Prerequisite: 103 or equivalent. Offered: S.

GERMAN 250 Advanced Conversational German Through Films (2, max. 6) VLP Conversational practice in small groups based on films. May be taken concurrently with other Germanics courses. Offered: AWSp.

GERMAN 293 Introduction to Contemporary German Culture (5) VLP/ISS Introduction to culture of today's German-speaking world through readings from various media and discussion of diverse manifestations of both high and popular culture, its underlying beliefs and values, and its institutions and historical background. Readings and discussions in English.

GERMAN 299 Supervised Study (1-5, max. 10) VLP Prerequisite: permission of department adviser.

GERMAN 300 Studies in Germanics (3/5) VLP Topics or figures of German literature or language. German texts. Prerequisite: 15 credits in second-year German or equivalent.

GERMAN 301, 302, 303 Conversation and Writing Skills (3-6; 3-5; 3-5) VLP Language skill development (speaking, writing) using materials selected to broaden understanding of German-speaking countries. Prerequisite: 203 or diagnostic exam. Offered: AW, WSp, Sp.

GERMAN 311 Critical Approaches to German Literature (3-5) VLP Introduction to literary terminology. Diverse interpretive strategies, ranging from close reading to biographical and sociological approaches. Characteristics of different genres (poetry, prose, drama). Readings primarily from twentieth-century literature. Prerequisite: second-year German or equivalent or permission of instructor. Offered: A.

GERMAN 312 Historical Approaches to German Literature (3-5) VLP German literature from the Middle Ages to the present: Medieval Courtly period, Baroque, Enlightenment, Sturm und Drang, Classicism, Romanticism, Realism, Neoromanticism, Expres-

sionism. Prerequisite: reading knowledge of German. Offered: W.

GERMAN 313 Major Figures of German Literature (3-5) VLP Focus on major figure such as Goethe, Schiller, Kleist, Fontane, Thomas Mann, Kafka. Emphasis on his/her cultural and sociopolitical contexts. Literary and nonliterary texts, including film, art, political, historical, and philosophical texts. Prerequisite: second-year German or equivalent or permission of instructor. Offered: Sp.

GERMAN 322 Introduction to German Studies (3-5) VLP German quest for national identity and the conflict of unity and division. Readings from literature, history, politics, and anthropology. Prerequisite: reading knowledge of German. Offered: W.

GERMAN 323 Institutions and Their Ideas (3-5) VLP/ISS Analysis of central institutions of contemporary Germany in their historical development. Prerequisite: reading knowledge of German. Offered: Sp.

GERMAN 333 Business German I (5) VLP Introduction to the language and practices of German business. Covers marketing, finance, accounting, economic theory, stock exchange, shipping, and production. Prerequisite: two years college-level German. Offered: A.

GERMAN 334 Business German 2 (5) VLP Introduction to the language and practices of German business. Covers industry, accounting, banking, and international trade. Prerequisite: 333 or equivalent. Offered: W.

GERMAN 395 Proctoring of First-Year German Film Course (1-2, max. 6) VLP Restricted to upper-division students of German who have demonstrated sufficient proficiency in speaking German to lead discussion groups in 150. Leaders may participate one or two hours per week and receive 1 credit for each hour in class with 6 credits allowed in 3 quarters. Credit/no credit only. Offered: AWSp.

GERMAN 396 Proctoring of Second-Year German Film Course (1-2, max. 6) VLP Restricted to upper-division students of German who have demonstrated sufficient proficiency in speaking German to lead discussion groups in 250. Leaders may participate one or two hours per week and receive 1 credit for each hour in class with 6 credits allowed in 3 quarters. Credit/no credit only. Offered: AWSp.

GERMAN 397 Foreign Studies in German Literature (1-6, max. 15) VLP

GERMAN 398 Foreign Studies in German Language (1-6, max. 15) VLP

GERMAN 399 Foreign Studies in German Culture (1-6, max. 15) VLP/ISS

GERMAN 401, 402, 403 Advanced Writing and Conversation (3-5; 3-5; 3-5) VLP Texts and exercises, both grammatical and stylistic, to develop vocabulary, stylistic awareness, and the practical application of grammatical rules in written German. Prerequisite: 303 or diagnostic exam. Offered: AWSp.

GERMAN 411 Studies in Medieval Literature and Culture (5) VLP Rotating special topics in literature and culture of the Middle Ages, such as particular movements, authors, genres, themes, or problems.

GERMAN 412 Studies in Renaissance and Baroque Literature and Culture (5) VLP Rotating special topics in literature and culture of the Renaissance and Baroque, such as particular movements, authors, genres, themes, or problems.

GERMAN 421 Studies in Eighteenth-Century Literature and Culture (5) VLP Rotating special topics in literature and culture of the eighteenth century, such as particular movements, authors, genres, themes, or problems.

GERMAN 422 Studies in Nineteenth-Century Literature and Culture (5) VLPA Rotating special topics in literature and culture of the nineteenth century, such as particular movements, authors, genres, themes, or problems.

GERMAN 423 Studies in Twentieth-Century Literature and Culture (5) VLPA Rotating special topics in literature and culture of the twentieth century, such as particular movements, authors, genres, themes, or problems.

GERMAN 444 Undergraduate Thesis in Germanics (5) VLPA Supervised research leading to the writing of a research thesis.

GERMAN 445 Undergraduate Honors Thesis in Germanics VLPA (5) Supervised research for honors students leading to the writing of an honors thesis.

GERMAN 451 Linguistic Analysis of German (3-5) VLPA Prerequisite: third-year German or permission of instructor. Offered: A.

GERMAN 452 History of the German Language (3-5) VLPA From early Germanic to the present. Prerequisite: third-year German or permission of instructor. Offered: W.

GERMAN 490 Contemporary German Literature (3-5) VLPA Interpretation of selected works by contemporary German authors.

GERMAN 493 Special Topics in German Culture (3-5) VLPA/I&S

GERMAN 494 Studies in German Poetry (3-5) VLPA Introduction to various methods of interpretation and to their practical application.

GERMAN 495 Proseminar in German Literature (3-5, max. 15) VLPA Special topics, the subject matter and depth of which are not included in other literature courses, arranged through consultation among students and faculty members. Prerequisite: 15 credits in third-year German or permission of instructor.

GERMAN 496 History of Germanic Philology (3-5) VLPA Introduction to the works of outstanding scholars in the field of Germanics.

GERMAN 497 Studies in German Literature (1-6, max. 15)

GERMAN 498 Studies in the German Language (1-6, max. 15)

GERMAN 499 Studies in German Culture (1-6, max. 15)

Courses in English

GERMAN 210 Classics of German Literature and Thought (5) VLPA Introduction to major figures of German culture from the Reformation to the present, their contribution to the intellectual life of the Western world. Luther, Kant, Goethe, Schopenhauer, Marx, Freud, Nietzsche, Kafka, Brecht, and Mann.

GERMAN 340 Friedrich Nietzsche in English (3-5) VLPA/I&S Analysis of Friedrich Nietzsche's chief works and the discussion of his position within modern German literature and thought.

GERMAN 341 Franz Kafka in English (3-5) VLPA Short stories and novels of Franz Kafka; emphasis on philosophical relevance and esthetic significance.

GERMAN 342 Thomas Mann in English (3-5) VLPA

GERMAN 345 Bertolt Brecht in English (3-5) VLPA Brecht's life and work, particularly his plays and writings on theatre, and some poems and short prose pieces to provide additional perspective on his life and work as a whole. The development of his writing and of his ideas and attitudes.

GERMAN 346 The Contemporary German Novel in English (3-5) VLPA Major novels of the postwar

period (1945 to present), discussed in their historical context. Contrasts between West and East German writers, such as Mann, Frisch, Grass, Boll, Lenz, Wolf, and Plenzdorf.

GERMAN 349 Goethe in English (3-5) VLPA Selected major works (especially *Faust*) of Goethe, whose literary, philosophical, and scientific achievements are examined as integral parts of his quest for meaning, wholeness, and universality, and whose impact on Western thinking is traced up to Thomas Mann and C. G. Jung.

GERMAN 350 The German Drama in English (3-5) VLPA German drama from the eighteenth to the twentieth centuries. German history and culture as reflected in the plays. Discussion of major themes.

GERMAN 351 Vienna 1900 in English (3-5) VLPA/I&S Interdisciplinary study of Vienna at the turn of the century. Discussion of literary texts with emphasis on other intellectual and cultural trends of this very rich and complex period.

GERMAN 352 Literature and Society in Weimar and National Socialist Germany in English (3-5) VLPA/I&S Literature, theater, and film, with adjunct consideration of art and architecture, in relation to the German social and cultural situation circa 1918 to circa 1947.

GERMAN 353 Postwar Germany (3-5) VLPA/I&S Postwar development and present-day character of cultural, social, and political life in Germany. Readings include literary and nonliterary texts devoted to culture and everyday life.

GERMAN 355 German Literature and Film in English (3-5) VLPA Relationship between literature and film in the German tradition. Content varies; focus may be on a particular time period, director, or theme. Special attention paid to critical and analytical skills required for interpreting the two mediums.

GERMAN 356 Pagan Germany: Myth, Religion, Folklore in English (3-5) VLPA/I&S *Jaeger* History and culture of the German peoples before and during the conversion to Christianity. Readings include Tacitus's *Germania* and other historical sources, *Beowulf*, *Nibelungenlied*, Grimm's Fairy Tales, and German legends. Treatment of archaeological finds and a variety of materials that bear on religion, prophecy, magic, folk customs, and festivals.

GERMAN 360 Women in German Literature in English (5) VLPA Investigates the changing social roles of women in German society on the example of various literary texts from different periods.

GERMAN 390 Germanic Studies in English (3/5, max. 15) VLPA Topics or figures of German literature or language.

Courses for Graduates Only

GERMAN 500 Literary Theory, Methodology, and Bibliography (5) Historical survey and analysis of criticism (*Methodengeschichte*) and modern trends in contemporary theory. Methods of research and bibliography, as well as theoretical aspects of practical interpretation.

GERMAN 501 Proseminar in Methods and Writing (5) Introduction to research methods, presentation of research, scholarly writing, and general poetological issues. Each year a different special topic is chosen as a focus for students' research in the course.

GERMAN 503 Contemporary German Literature (3-5, max. 15) Seminar analyzing the esthetic movements and thought of contemporary West, as well as East German literature, the social and political problems dealt with in the works of representative authors, and major experimental concepts. Some previous exposure to the German literature and civilization after 1945 is expected.

GERMAN 504 Special Studies in Literary Criticism and Theory (3-5, max. 15) Literary criticism and theory, focusing on special topics proposed by the instructor. Taught in English. Prerequisite: 500 or equivalent.

GERMAN 510 Studies in Medieval Literature and Culture (5, max. 15) Seminar on rotating special topics in literature and culture of the Middle Ages, such as particular movements, authors, genres, themes, or problems.

GERMAN 511 Studies in Renaissance and Baroque Literature and Culture (5, max. 15) Seminar on rotating special topics in literature and culture of the Renaissance and Baroque, such as particular movements, authors, genres, themes, or problems.

GERMAN 512 Studies in Eighteenth-Century Literature and Culture (5, max. 15) Seminar on rotating special topics in literature and culture of the eighteenth century, such as particular movements, authors, genres, themes, or problems.

GERMAN 514 Studies in Nineteenth-Century Literature and Culture (5, max. 15) Seminar on rotating special topics in literature and culture of the nineteenth century, such as particular movements, authors, genres, themes, or problems.

GERMAN 516 Studies in Twentieth-Century Literature and Culture (5, max. 15) Seminar on rotating special topics in literature and culture of the twentieth century, such as particular movements, authors, genres, themes, or problems.

GERMAN 518 Foreign Language Teaching Methodology (2) *Brandl* Current foreign language teaching methods and approaches. Learning and teaching strategies and techniques for the four skills (reading, writing, speaking, listening) including cultural notions. Current and future trends in pedagogy and technology. Offered: jointly with ASIAN 518/NEAR E 518/SCAND 518/SLAV 518.

GERMAN 525 Seminar in Romanticism (3-5, max. 15)

GERMAN 526 Seminar in Nineteenth-Century Drama (3-5, max. 15)

GERMAN 527 Seminar in Nineteenth-Century Prose (3-5, max. 15)

GERMAN 528 Nineteenth-Century Poetry (3-5, max. 15) Representative selections from Hölderlin, the late Goethe, and from prevalent trends in nineteenth-century poetry, such as romanticism, "Young Germany," poetic realism, and the experimental poetry of naturalism.

GERMAN 529 Studies in Literature 1870-1920 (5, max. 15) Seminar on rotating special topics drawn from the period 1870-1920, such as particular movements, authors, genres, themes, or problems.

GERMAN 533 Seminar in Eighteenth-Century Literature (3-5, max. 15) Study of one or more of the literary movements: Enlightenment, sentimentalism, anacreontics, storm and stress, classicism, early romanticism, and works by principal authors such as Gothsched, Bodmer, Gellert, Lessing, Wieland, Klopstock, Herder, Lenz, Goethe, Schiller, Jean Paul.

GERMAN 534 Storm and Stress (3-5, max. 15) Extensive investigation of poetological and esthetic concepts advanced by initiators and exponents of German storm and stress. Analyses of narrative and dramatic works of storm and stress reveal reflections and implementations of the new theoretical concepts.

GERMAN 535 Classicism: Goethe, Schiller (3-5, max. 15)

GERMAN 537 Studies in Literature 1770-1830 (5, max. 15) Seminar on rotating special topics drawn from the period 1770-1830, such as particular movements, authors, genres, themes, or problems.

GERMAN 540 Twentieth-Century Poetry (3-5, max. 15) Development of German poetry from Rilke, Hofmannsthal, and George through Trakl, Benn, the Expressionists and the Dadaists, Brecht, and Enzensberger, to such contemporaries as Eich, Heissenbüttel, the concrete poets, Celan, and Bachmann.

GERMAN 541 Twentieth-Century German Drama (3-5, max. 15) Selection from modern German drama representative of the concern with the human condition, of social criticism, and of experimentation with the new dramatic forms.

GERMAN 542 Twentieth-Century Prose (3-5, max. 15) Selected modern German novels, short novels, and short stories by representative authors dealing with the social and political problems of Germany as well as with individual problems of existence and identity.

GERMAN 550 Gothic (3-5)

GERMAN 551 Seminar in Germanic Philology and Linguistics (3-5, max. 15) Topics vary. Prerequisites: basic knowledge of German and at least one elementary linguistics course.

GERMAN 552 Old High German (3-5)

GERMAN 555 Old Saxon (3-5)

GERMAN 556 Middle High German (3-5)

GERMAN 558 Middle High German Literature (3-5)

GERMAN 560 Modern Dialects (3-5)

GERMAN 565 Seminar in Courtly Epic (3-5) Aspects and methods of literary analysis pertaining to the study of medieval courtly epics.

GERMAN 566 Late Middle High German Narrative (3-5)

GERMAN 567 Minnesang (3-5) In-depth study of medieval German lyrics in the context of German and European literary and intellectual development. Poems of the period from Kurenberger through Walther are analyzed with stress on grammatical, formal, stylistic, and ideological interpretation. Prerequisite: adequate knowledge of Middle High German.

GERMAN 568 Seminar in Heroic Epic (5) Literary and historic problems of the German heroic epic, with special emphasis on the Nibelungenlied and the Dietrichsepik.

GERMAN 575 Teaching of German Literature and Civilization (3) Teaching of German language and literature on the advanced level in secondary schools and colleges. Credit/no credit only.

GERMAN 576 Modern Methods and Materials in Teaching German (3) The audiolingual method and its application; current developments in foreign-language teaching; evaluation of teaching materials. Credit/no credit only.

GERMAN 577 Principles of Second Language Learning (2)

GERMAN 580 Seminar in German Literature (3/5, max. 15) Open topics seminar with varying content.

GERMAN 581 Seminar in Poetry (3/5, max. 15) Open topics seminar with varying content.

GERMAN 582 Seminar in Drama (3/5, max. 15) Open topics seminar with varying content.

GERMAN 583 Seminar in Prose (3/5, max. 15) Open topics seminar with varying content.

GERMAN 590 Philosophical Issues in German Culture (5, max. 15) Seminar on rotating special topics dealing with the impact of particular thinkers, movements, or philosophical problems in German culture.

GERMAN 591 Studies in German Intellectual History (5, max. 15) Seminar on rotating special topics dealing with interactions of history, literature, and culture in the German tradition.

GERMAN 592 Cultural Studies (5, max. 15) Seminar on rotating special topics dealing with periods, themes, or particular problems in German life and culture.

GERMAN 600 Independent Study or Research (*)

GERMAN 700 Master's Thesis (*)

GERMAN 800 Doctoral Dissertation (*)

History

315 Smith

History undertakes the study of human affairs in a manner that seeks to understand change and development rather than the state of things at a given moment, taking into account societies in diverse parts of the world from the earliest times for which written records exist to the present.

Undergraduate Program

Advisers
203 Smith

Bachelor of Arts

Admission Requirements: 2.00 overall GPA; 10 credits in history with minimum 2.50 GPA; 10 credits composition/writing with minimum 2.0 grade in each course. For the history and science emphasis, HIST 311 and 312 constitute the 10 required credits of history with minimum 2.50 GPA; 10 credits of college-level science are also required.

Major Requirements

History: 55 credits in history with minimum GPA of 2.25 in all history courses and minimum 2.0 grade in all history courses taken to fulfill requirements for the major. At least 5 credits each of ancient, medieval, modern European, and United States history (HIST 111, 112, 113, and HSTAA 201 or upper-division courses in the same subject areas; adviser must approve substitutions for the basic courses) plus an additional 5 credits in the history of some area or nation outside Europe, the United States, and Canada. At least 25 upper-division credits. One undergraduate seminar or colloquium is required, with a major paper. Beyond the required subjects, the student may or may not specialize, depending upon personal interests and career plans. In addition to all courses with the prefix HIST, the history major may include approved courses offered outside the Department of History. A short list of these courses is maintained by undergraduate advisers. Transfer students are required to complete a minimum of 25 upper-division credits in history taken in residence at the UW.

History and Science Emphasis: 55 credits in history with minimum GPA of 2.25 in all history courses and minimum 2.0 grade in all history courses taken to fulfill requirements for the major. Requirements include 15 credits of HIST 311, 312 and one additional approved course in the history of science, technology, and medicine; 5 credits for junior colloquium; 10 credits for senior thesis; of the remaining 25 credits in history at least 20 must be in courses outside the history of science and must include at least one course each in European history, American history, and an area or nation outside Europe, the United States, and Canada; 35 credits of Natural World courses to include at least 20 credits above the 100 level in the same Natural World department. Natural World courses are to be chosen from astronomy, atmospheric sciences, biology, botany, chemistry, computer science, environmental studies, geological sciences, mathematics, physics, psychology, and zoology.

ogy, botany, chemistry, computer science, environmental studies, geological sciences, mathematics, physics, psychology, and zoology.

Minors

Minor Requirements

History: 30 credits of history, of which 20 must be upper-division, with a minimum grade of 2.0 in each course applied toward the minor. A minimum of 15 of the 20 upper-division credits must be completed in residence at the UW.

History of Science: 25 credits, including HIST 311, 312, 390, and 490; plus one course from HIST 215, 310, 313, 315, 316, 317, 318, 412, 498 (when topic is relevant), MHE 401, 422, 424. 2.0 minimum grade required in each course.

Graduate Program

Raymond A. Jonas, Graduate Program Coordinator

The Department of History offers graduate training leading to the Master of Arts and Doctor of Philosophy degrees in a large number of fields within the discipline. Students in the programs prepare for careers as college teachers who combine teaching with scholarship and professional writing. A few graduates enter government service, college administration, or publishing. The M.A. program is normally completed in four or five full-time academic quarters or their equivalent. The Ph.D. program requires at least three years of full-time work beyond the M.A. degree. Graduate training at both levels includes (1) course work and independent study leading to examinations in special historical fields, and (2) sustained investigation and interpretation of historical problems in seminars involving the writing of essays. A dissertation must be prepared for the Ph.D.

Special Requirements

Admission to the graduate program requires a sound undergraduate major in history or in one of the basic disciplines related to history completed within a college of liberal arts and sciences. The department also requires evidence of the applicant's ability to write cogently and lucidly and to interpret historical data.

Financial Aid

Beginning graduate students may qualify for a limited number of fellowships, readerships, and work study assistantships. Students with, or who expect to receive, the M.A. degree by the time they begin their duties may apply for teaching assistantships and may, with continued satisfactory scholarly progress, expect reappointment for a total of three years, provided adequate funds are available.

Correspondence and Information

Graduate Program Coordinator
206B Smith, Box 353560

Faculty

Chair

Richard R. Johnson

Professors

Alden, Dauril * 1959; MA, 1952; PhD, 1959, University of California (Berkeley); Latin American history, comparative colonial history.

Bacharach, Jere L. * 1967; MA, 1962, Harvard University; PhD, 1967, University of Michigan; history of the Middle East, Islamic.

Benson, Keith R. * 1981, (Adjunct); MA, 1973, PhD, 1979, Oregon State University; history of modern American biology, marine biology, and evolutionary biology.

Bergquist, Charles W. * 1989; MA, 1968, PhD, 1973, Stanford University; modern Latin American history, comparative labor history, Third World development.

Bridgman, Jon M. * 1961; PhD, 1960, Stanford University; modern European history (especially military).

Burke, Robert E. * 1957, (Emeritus); PhD, 1950, University of California (Berkeley); American political and social history in the twentieth century.

Butow, Robert J. C. * 1960, (Emeritus); PhD, 1953, Stanford University; East Asian diplomatic history.

Conlon, Frank F. * 1968; PhD, 1969, University of Minnesota; history of India.

Ellison, Herbert J. * 1968; PhD, 1955, University of London (UK); modern Russian history.

Ferrill, Arthur L. * 1964; PhD, 1964, University of Illinois; Ancient Rome, military history.

Findlay, John M. * 1987; PhD, 1982, University of California (Berkeley); history of the American West.

Fowler, Wilton B. * 1969; PhD, 1966, Yale University; American history (especially diplomatic).

Gil, Carlos * 1974; PhD, 1975, University of California (Los Angeles); Latin America and history of the Chicano people.

Griffiths, Gordon 1959, (Emeritus); PhD, 1942, University of California (Berkeley); MA, 1946, Oxford University (UK); Renaissance and Reformation.

Hankins, Thomas L. * 1964; PhD, 1964, Cornell University; history of science.

Hanley, Susan B. * 1970, (Adjunct); PhD, 1971, Yale University; premodern Japan.

Johnson, Richard R. * 1972; PhD, 1972, University of California (Berkeley); United States colonial history.

Kirkendall, Richard S. * 1988; PhD, 1958, University of Wisconsin; recent United States history.

Lebsock, Suzanne D. * 1995; MA, 1973, PhD, 1977, University of Virginia; history of women, American social history, history of the South.

Levy, Fred J. * 1960; PhD, 1960, Harvard University; history of England in the sixteenth- and seventeenth-centuries, English historiography.

McCormick, Richard L. 1995; PhD, 1976, Yale University; U.S. political history.

Palais, James B. * 1968; PhD, 1968, Harvard University; modern Korean history.

Pease, Otis A. * 1966, (Emeritus); PhD, 1954, Yale University; United States in the twentieth century.

Pressly, Thomas J. * 1949, (Emeritus); PhD, 1949, Harvard University; nineteenth-century U.S., Civil War and Reconstruction.

Pyle, Kenneth B. * 1964; PhD, 1965, Johns Hopkins University; modern Japanese history.

Ramet, Sabrina P. * 1983, (Adjunct); PhD, 1981, University of California (Los Angeles); politics and history of former Yugoslavia, East European religion and culture.

Rorabaugh, William J. * 1976; PhD, 1976, University of California (Berkeley); United States social history.

Saum, Lewis O. * 1965; PhD, 1962, University of Missouri; American intellectual history.

Stacey, Robert C. * 1988; PhD, 1983, Yale University; medieval England, medieval Judaism, political and legal history.

Sugar, Peter * 1959, (Emeritus); PhD, 1959, Princeton University; political and economic history of eastern Europe and Near East since the eighteenth-century.

Sullivan, Woodruff T. III * 1973, (Adjunct); PhD, 1971, University of Maryland; radio astronomy, galactic and extragalactic structure, history of astronomy.

Thomas, Carol G. * 1964; PhD, 1965, Northwestern University; ancient Greece.

Toews, John E. * 1979; PhD, 1973, Harvard University; modern European intellectual history.

Ullman, Joan Connolly * 1966, (Emeritus); PhD, 1963, Bryn Mawr College; modern Spain.

Walter, John C. * 1989, (Adjunct); PhD, 1972, University of Maine; African American history, American women's history, the New Deal.

White, Richard * 1990; PhD, 1975, University of Washington; American West, American Indian, environmental history.

Whorton, James C. * 1970, (Adjunct); PhD, 1969, University of Wisconsin; history of American medicine, public health, alternative healing, pharmacy and biochemistry.

Williams, Michael A. * 1976, (Adjunct); PhD, 1977, Harvard University; early Christianity and religions of antiquity.

Associate Professors

Barlow, Tani E. 1994, (Adjunct); MA, 1979, PhD, 1985, University of California (Davis); gender politics, modernity, women in China.

Behlmer, George K. * 1979; MA, 1972, PhD, 1977, Stanford University; modern English history.

Felak, James R. * 1989; PhD, 1989, Indiana University; modern East European history.

Gamboa, Erasmo * 1976, (Adjunct); MA, 1973, PhD, 1984, University of Washington; history, Chicano experience, Pacific Northwest.

Glenn, Susan A. * 1993; PhD, 1983, University of California (Berkeley); twentieth-century U.S. social history including women's history, immigration, labor, popular culture.

Gowing, Alain M. * 1988, (Adjunct); PhD, 1988, Bryn Mawr College; Latin and Greek historiography, Latin literature of the Empire.

Gregory, James N. * 1993; PhD, 1983, University of California (Berkeley); U.S. social and political history since 1865, labor, the West.

Guy, R. Kent * 1980; PhD, 1981, Harvard University; modern Chinese history.

Hevly, Bruce W. * 1989; PhD, 1987, Johns Hopkins University; history of technology and history of modern physics.

Jonas, Raymond A. * 1985; PhD, 1985, University of California (Berkeley); modern France.

Kieval, Hillel J. * 1985; PhD, 1981, Harvard University; modern Jewish history, modern European history (Central and Eastern Europe).

Leiren, Terje I. * 1977, (Adjunct); PhD, 1978, North Texas State University; Scandinavian history, nationalism, immigration, ethnicity, Norwegian language.

McKenzie, Robert T. * 1988; PhD, 1988, Vanderbilt University; nineteenth-century U.S., U.S. economic.

O'Neil, Mary R. * 1983; PhD, 1982, Stanford University; Renaissance/Reformation, early modern Europe, social history, Italy before 1700.

Sears, Laurie J. * 1989; PhD, 1986, University of Wisconsin; Southeast Asian social and cultural history.

Stacey, Robin C. * 1988; PhD, 1986, Yale University; early and high medieval history, tribal law, Celtic/Anglo-Saxon literature, heresy.

Waugh, Daniel Clarke * 1972; PhD, 1972, Harvard University; medieval Russian history.

Wineburg, Samuel S. * 1989, (Adjunct); PhD, 1990, Stanford University; educational psychology, cognitive psychology of school subjects, historical cognition.

Yee, Shirley J. * 1988, (Adjunct); PhD, 1987, Ohio State University; U.S. women's history, African-American history, nineteenth-century U.S. social history.

Assistant Professors

Poiger, Uta G. 1995; MA, 1990, PhD, 1995, Brown University; modern German history.

Young, Glennys J. * 1992; PhD, 1989, University of California (Berkeley); late Imperial and early Soviet Russia.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

Upper-division courses (300 and 400 levels) in the Department of History do not generally require prerequisites. Most 400-level courses deal with a single nation during a limited period. The 300-level courses deal with broader subjects at a relatively advanced level. Both are primarily for juniors and seniors, but they are open to freshmen and sophomores with an interest or background in the subject of the course.

History

HIST 111 The Ancient World (5) I&S Origins of Western civilization to the fall of Rome.

HIST 112 The Medieval World (5) I&S Political, economic, social, and intellectual history of the Middle Ages. Cannot be taken for credit toward a history major if HISTAM 331 or 332 or 333 previously taken.

HIST 113 The Modern World (5) I&S Political, economic, social, and intellectual history of modern Europe. Cannot be taken for credit toward a history major if HISTEU 302 or 303 previously taken.

HIST 140 Russia from the Tenth Century to the Present (5) I&S - Waugh Russian political, social, and economic history from the tenth century to the present. Offered: jointly with SISRE 140.

HIST 192 The Historian as Detective (5) I&S Examples illustrate how "clues" from the past are used by historians to build inferential "cases"; collection, analysis, and interpretation of evidence as a historical method. Open to all students.

HIST 199 Foreign Study (3-5, max. 10) I&S Lower-division history courses, for which there are no direct University of Washington equivalents, taken through the University of Washington Foreign Study Program.

HIST 204 Europe and America in the Era of the World Wars (5) I&S Bridgman Declining role of Europe in the world and rise of the United States from 1914 to 1945.

HIST 207 Introduction to Intellectual History (5) I&S Toews Ideas in historical context. Comparative and developmental analysis of Western conceptions of "community", from Plato to Freud. Offered: jointly with CHID 207.

HIST 211 Introduction to the History of Science (5) I&S Hankins, Hevly Introduction to major themes in the history of science. Investigation of historical and scientific methods through the study of particular historical cases.

HIST 215 The History of the Atomic Bomb (5) I&S Hankins History of the atomic bomb from the beginning of nuclear physics to the security hearing of J. Robert Oppenheimer. Includes a study of the scientific achievements that made the bomb possible, the deci-

sion to deploy the bomb, the moral misgivings of the scientists involved.

HIST 249 Introduction to Labor Studies (5) I&S Conceptual and theoretical issues in the study of labor and work. Role of labor in national and international politics. Formation of labor movements. Historical and contemporary role of labor in the modern world. Offered: jointly with POL S 249/SOC 266.

HIST 250 The Jews in Western Civilization (5) I&S Kieval History of the Jews from late antiquity to the present. Examines the relationship between Jewish communities and the larger societies in which they are found.

HIST 261 Survey of the Muslim Near East (5) I&S Bacharach The Middle East (the Arab countries, Israel, Turkey, Iran, and Afghanistan) from the emergence of Islam in AD 622 to the present: culture, economics, politics.

HIST 283 Introduction to Women's History (5) I&S Yee Includes units on American, European, and Third World women that examine centers of women's activities (convents, women's clubs), women's place in male-dominated spheres (politics), women's impact on culture (health, arts), and the effect of larger changes on women's lives (technology, colonization). Offered: jointly with WOMEN 283.

HIST 294 Honors Historiography (5) I&S Levy Readings in the great historians, from the earliest time to the beginning of the twentieth century. Investigates how perception of the human past has altered our times.

HIST 307 History of Christianity (5) I&S Christian religion, including doctrine, practice, church organization, and culture, from the time of Jesus Christ to the present. No attempt to avoid the controversial aspects of the topic is made, but the necessity of founding argument on knowledge is stressed.

HIST 309 Marx and Nietzsche: The Assault on Bourgeois-Christian Civilization (5) I&S Toews Major dilemmas and conflicts of modern Western consciousness through historical analysis of Marx, Nietzsche, and the movements they spawned. Emphasis on the relationship between sociocultural change, biography, and ideological innovation. Recommended: 113 or 207.

HIST 310 Science and Religion in Historical Perspective (5) I&S Hankins Scientific and religious ideas have been two of the major forces shaping our modern view of the world. Often regarded as being in conflict, they can equally well be seen as complementary and interdependent. Study of the relationship between scientific and religious ideas with focus on particular episodes of history from ancient to modern times.

HIST 311 Science in Civilization: Antiquity to 1600 (5) I&S Hankins, Hevly From preclassical antiquity to the end of the Middle Ages, stressing the growth of scientific ideas, the cultural context in which they take shape, and their relationship to other movements of thought in the history of civilization.

HIST 312 Science in Civilization: Science in Modern Society (5) I&S Hankins Growth of modern science since the Renaissance, emphasizing the scientific revolution of the seventeenth century, the development of methodology, and the emergence of new fields of interest and new modes of thought.

HIST 313 Science in Civilization: Physics and Astrophysics Since 1850 (5) I&S/NW Hankins, Hevly, Sullivan Organization and pursuit of the physical and astrophysical sciences, focusing on the major unifying principles of physics and astronomy and the social and cultural settings in which they were created. Offered: jointly with ASTR 313.

HIST 314 The Psychoanalytic Revolution in Historical Perspective (5) I&S Toews Genesis and

evolution of Freudian theory in context of the crisis of liberal-bourgeois culture in central Europe and parallel developments in philosophy, literature, and social theory. Emergence and division of the psychoanalytic movement. Transformation of psychoanalysis as it was absorbed into British, French, and especially American cultural traditions. Recommended: 207 and 113 or HSTEU 303.

HIST 315 History of Technology to 1940 (5) I&S Hevly Technology since the Middle Ages, in its social and historical contexts. From the medieval foundations of metal working, its social consequences and the establishment of a class of engineering practitioners, to the transformation of American rural life, domestic technology, and industry before World War II.

HIST 318 History of American Science (5) I&S Benson, Hevly History of science in the United States, including migration of European science, development in colonial America, growth of an American scientific community, and expansion of American science in the twentieth century. Issues of scientific attitudes to the natural world, race, ethnicity, and gender are included.

HIST 335 The United States and Vietnam (5) I&S Fowler American involvement in Vietnam, including: the complex of negotiations; strategies and objectives of both sides; military, political, and economic operations of the United States; efforts at pacification; impact of Vietnam on American affairs.

HIST 345 War and Society (5) I&S Bridgman Analysis of the techniques of war from the Renaissance to the present with consideration of the social, political, and economic consequences of war in the Western world.

HIST 346 Images of War in History, Literature, and Media (5) VLPA/I&S Sears Explores images of war generated by historians, writers, artists, filmmakers, television producers, and journalists, analyzing the perspectives on war adopted by various observers to see what motivates their representations. Focuses on ways in which various media shape images of war and the effect of this shaping on human consciousness.

HIST 361 Slavery in History: A Comparative Study (5) I&S Bacharach Slavery as a universal historical phenomenon lending itself to a comparative analysis is studied in terms of its philosophical justifications, economic importance, and local practices. The following historical periods are surveyed: the ancient Near East, Greece, Rome, Islam, Africa, Latin America, and North America.

HIST 363 Wars in the Modern Near East (3) I&S Bacharach The Middle East, scene of some of the most significant military events in modern world history, with focus on the repercussions for participants in terms of political and psychological changes. Resident military specialists supplement the historical approach by analyzing the battles and wars on these terms.

HIST 370 History of the Expansion of Islam (5) I&S Bacharach, Conlon Comparative perspective on the expansion of the religion and community of Islam from its origins to the modern age. Patterns and processes of expansion, conversion, and social and cultural assimilation in a number of world regions (e.g., the Arab World, Iberia, Anatolia, West Africa, Iran, India, and Southeast Asia). Specific case studies of Islam in its regional setting (e.g., South Asia).

HIST 390 Colloquium in History and Science (5) I&S Hankins Study in the history of science to bridge the gap between the natural sciences and the humanities. Students should have a strong background both in history and in a natural science. Prerequisite: permission of instructor or adviser.

HIST 395 Modern Historical Writing, Honors Seminar (5) I&S McKenzie New types of problems examined by historians and new techniques that have evolved for solution. Brief historiographical introduc-

tion, reaching back to the "scientific" historians of the mid-nineteenth century, then continues by examining the impact on historians of new disciplines such as psychology, sociology, and economics, and of new techniques such as statistics and prosopography. Readings are in the theorists and in those who followed their lead. Admission by departmental invitation only.

HIST 398 Advanced Historical Detection (5) I&S Examination of varieties of historical evidence and analysis by contemporary historians; discussion of weekly readings, some in common, others individually assigned; preparation of three short papers, one based upon original research in University of Washington manuscript holdings. For honors students, upper division. Prerequisites: 10 credits history or equivalent, and permission of instructor.

HIST 399 Advanced Foreign Study (3-5, max. 15) I&S Upper-division history courses, for which there are no direct University of Washington equivalents, taken through the University of Washington Foreign Study Program.

HIST 412 Science and the Enlightenment (5) I&S Hankins The role of science in relation to intellectual, social, economic, and religious forces in the eighteenth century, and growth of the international community in science during the same period.

HIST 425 History of the British Empire and Commonwealth Since 1783 (5) I&S Britain in the Caribbean, Africa, India, Southeast Asia, and the Pacific; and the settlement, economic development, and political evolution of Canada, Australia, New Zealand, and South Africa.

HIST 449 Issues in Comparative Labor History (5) I&S Role of labor in the modern world. Emphasis on the centrality of workers' struggles in the evolution of national societies on the conceptual, research, and expository strategies of contemporary students of the labor movement and on differences and relationships between labor in developed and underdeveloped countries.

HIST 461 History of the Middle East: 622-1300 (5) I&S Bacharach Political and economic analysis of the period circa AD 600, preliminary to rise of Islam, to arrival of the Turks. Muhammad's teaching and impact; Islamization and Arabization.

HIST 462 History of the Middle East: 1258-1798 (5) I&S Bacharach Conquests by successors of Ghengis Khan; creation in Egypt, Syria, and Iran of cavalry-based states; domination of political, social, and economic history by Ottoman and Safavid empires. The Napoleonic invasion.

HIST 463 History of the Middle East Since 1798 (5) I&S Bacharach Critical issues and themes in the changing Middle East, including Westernization, growth of nationalism, Arab-Israeli dispute, Iranian revolution, and the role of Islam.

HIST 467 Nations and States in the Modern World (5) I&S Development of national consciousness in the "old nations" of Europe before the French Revolution. Replacement by new nationalism, spreading into East Central Europe, Russia, Ibero-America, Asia, and Africa. Offered: jointly with SIS 467.

HIST 470 History of the Jews in the Twentieth Century (5) I&S Kieval Historical experience of the Jews since World War I in Europe, North America, and the Middle East under the impact of three developments: growth of mass-based American Jewish community, destruction of Jewish life in Central and Eastern Europe, and creation of the State of Israel. Offered: jointly with SISJE 470.

HIST 481 Economic History of Europe (5) I&S R. Thomas Origins of the modern European economy; historical analysis of economic change and growth from medieval times that stresses the preconditions and consequences of industrialization. Recom-

mended: ECON 200, 201. Offered: jointly with ECON 460.

HIST 490 Senior Thesis (5, max. 10) I&S Benson Preparation of the senior thesis for the History and Science emphasis.

HIST 491-492 Honors Historical Method (5-5) I&S The purposes, materials, and techniques of historical scholarship. Theory, practice, and criticism. For honors students. By permission only.

HIST 495 History Internship (1-5, max. 10) Off-campus independent fieldwork with a community agency in an apprenticeship or internship situation. Work to be jointly supervised by a member of the History Department and an on-site field supervisor.

HIST 496-497 Public and Local History (5-5) I&S Findlay Reviews the nonacademic applications of history (museums, parks, business, archives, planning, policy-making, popular media). Includes directed research and writing on local topics in one applied setting. Students ordinarily undertake a lengthy research project in an internship-like role. Prerequisite: permission of instructor.

HIST 498 Colloquium In History (3-5, max. 15) I&S Each seminar examines a different subject or problem. A quarterly list of the seminars and their instructors is available in the Department of History undergraduate advising office. Permission of instructor required.

HIST 499 Undergraduate Research (1-5, max. 15) Permission required.

History of the Americas

HSTAA 135 The American People and Their Culture in the Modern Era: A History of the United States Since 1940 (5) I&S Kirkendall Through study of documents, personal testimony, and other source materials, through written reports on historical problems, and through discussions, lectures, films, and audiovisual presentations, students are encouraged to examine evidence and to think "historically" about persons, events, and movements within the memory of their own generation and that immediately preceding theirs. Primarily for first-year students.

HSTAA 150 Afro-American History (5) I&S Walter Introductory survey of topics and problems in Afro-American history with some attention to Africa as well as to America. Provides some general knowledge and serves as a basic introductory course for a sequence of lecture courses and seminars in Afro-American history. Offered: jointly with AFFAM 150.

HSTAA 180 History of the Chicano People to 1848 (5) I&S Gil Historical survey of the Chicano people from pre-Hispanic times to the war between the United States and Mexico.

HSTAA 181 History of the Chicano People Since 1848 (5) I&S Gil Historical survey of the Chicano people since the war between the United States and Mexico. Recommended: 180.

HSTAA 200 The Peoples of the United States (5) I&S Gregory Surveys American diversity since 1500. Repeopling of America through conquest and immigration by Native Americans, Europeans, Africans, Asians, and Latin Americans. Contributions of various peoples and the conflicts between them, with special attention to changing constructions of race and ethnicity and evolving understandings of what it means to be American.

HSTAA 201 Survey of the History of the United States (5) I&S Fowler, McKenzie, Saum Supplies the knowledge of American history that any intelligent and educated American citizen should have. Objective is to make the student aware of his or her heritage of the past and more intelligently conscious of the present.

HSTAA 202 Makers of American Foreign Policy, 1776 to the Present (5) I&S Fowler Survey of the

history of American foreign relations. Focus on the individuals responsible for initiating new foreign policies or for realigning old ones.

HSTAA 212 The Military History of the United States From Colonial Times to the Present (5) I&S Hennes Development of American military policies, organizational patterns, tactics, and weaponry, from beginnings as a seventeenth-century frontier defense force to the global conflicts and military commitments of the twentieth century. Interaction and tension between need for an effective military force and concept of civilian control of that force.

HSTAA 281 Introduction to Latin American History: From Columbus to Castro (5) I&S Survey of political, economic, and social history of Latin America from the Iberian conquest to the present. Lectures, discussions, and films focus on developing understanding of Latin America's current problems through study of their historical roots. Designed for the beginning student and the nonspecialist.

HSTAA 285 Latin American History Through Film (5) VLP/I&S Bergquist Critical analysis of Latin American films as historical documents. Subjects include Iberian conquest and colonialism, the struggle for independence in the nineteenth century, social revolutions of the twentieth century, and problems of contemporary development. Readings and lectures place each film in the context of the historiography of the subject matter.

HSTAA 301 Foundations of American Civilization (5) I&S Johnson Early America from the sixteenth century to the end of the American Revolution: the founding years, social and religious development, race relations, development of the Atlantic world, origins and legacy of American independence.

HSTAA 302 American Civilization: The First Century of Independence (5) I&S McKenzie, Rorabaugh, Saum Establishment of the constitutional system; national expansion; intellectual and cultural development; internal conflicts, the Civil War, and Reconstruction.

HSTAA 303 Modern American Civilization From 1877 (5) I&S Emergence of modern America, after the Civil War; interrelationships of economic, social, political, and intellectual developments.

HSTAA 333 The American South Since the 1920s (5) I&S Fowler Political, social, and economic developments in the eleven states of the former Confederacy. Special attention to the questions of race relations, civil rights, and cultural distinctiveness. Recommended: 201.

HSTAA 351 American Constitutional History: From Colonial Times to the Present (5) I&S Johnson European origins; the constitution-making of the American Revolution; the growth of government; Civil War and Reconstruction as constitutional crises; reform and the new federalism; the Supreme Court and civil rights; Congress, the presidency, and modern American constitutionalism.

HSTAA 365 The History of the American Film (5) VLP/A American films and film-making technology; the film industry and its financing and marketing strategies. Cultural, social, political, and economic impact of films upon American society.

HSTAA 370 Consumer Culture in the Modern United States (5) I&S Studies the American attempt in this century to create, sustain, and organize the world's first consumer-oriented industrial society. Topics to be considered include: the economy of mass consumption, how a culture of consumption was created, and the ideas of social critics who have rejected consumerism.

HSTAA 373 Social History of American Women (5) I&S Yee Multi-racial, multi-cultural study of United States' women. Sixteenth century to present: emphasis

on women's unpaid work; participation in paid labor force; charitable, reform activities; feminist movements of nineteenth, twentieth centuries. Use of primary materials, i.e., diaries, letters, speeches, artifacts. Prerequisite: 201, WOMEN 200 or 283, or permission of instructor. Offered: jointly with WOMEN 383.

HSTAA 377 History of Canada (5) I&S General survey and analysis of political, economic, social, and cultural aspects of Canadian history from the foundation of New France to present; Canadian-American relations, the rise of Quebec nationalism, and the development of the Canadian West.

HSTAA 381 Latin America: The Early Colonial Period (5) I&S Alden Discovery and founding of Spanish and Portuguese empires in the New World and their development until the eighteenth-century reorganizations.

HSTAA 382 Latin America: Late Colonial and Early National Periods (5) I&S Alden Imperial reforms, the struggle for independence; the founding of new nations.

HSTAA 383 Modern Latin America (5) I&S Bergquist Analysis of economic problems, political and social changes, and intellectual trends in major Latin American republics since the late nineteenth century.

HSTAA 384 Latin America: Inter-American and Intra-Continental Relations (5) I&S Bergquist, Gil Inter-American relations, focusing on the United States' diplomatic and military responses to the problems of Latin America since 1776. Intra-Latin American relations and regional organizations (e.g., the Organization of American States).

HSTAA 401 American Revolution and Confederation (5) I&S Johnson Causes of separation of the United States from the British empire; political theory of the Revolution; its military history; diplomacy of the Revolution; the Revolution as a social movement; intellectual aspects; readjustment after independence; the formation of the American union; the Constitution.

HSTAA 404 New England: From the Foundings to the Civil War (5) I&S Johnson New England from colonial beginnings to the region's emergence to national leadership in the mid-nineteenth century. Emphasis on Puritanism, the New England town, adjustment to empire, revolution and constitution making, the growth of party, abolitionism, the flowering of a regional culture, and the personalities who embodied these key themes and periods.

HSTAA 409 American Social History: The Early Years (5) I&S Rorabaugh Survey of American society and institutions from the colonial era through the Civil War, with special attention to reform, labor, immigration, education, law enforcement and the city.

HSTAA 410 American Social History: The Modern Era (5) I&S Rorabaugh Survey of American society and institutions from Reconstruction to the present with special attention to reform, poverty, social mobility, immigrant and ethnic groups, the city and law enforcement.

HSTAA 411 The United States During the Era of Civil War and Reconstruction (5) I&S McKenzie Conflicting interests, ideologies, and ways of life in the United States from the 1840s to the 1870s.

HSTAA 412 The Westward Movement, 1700-1850 (5) I&S Findlay Anglo-American advance into interior of continental United States culminating in occupation of Far West. Rivalry with New France and New Spain in colonial period; role of federal government in westward expansion; land policy and land distribution; migration, settlement, and the pioneering experience; federal Indian policies and implementation; political evolution, urbanization, and economic development of trans-Appalachian West; shaping of national character and institutions.

HSTAA 413 History of the Trans-Mississippi West (5) I&S Findlay Anglo-American exploration, conquest, occupation, and exploitation of the trans-Mississippi West, with emphasis on economic development into the twentieth century. Considers wide range of developmental themes (social, political, cultural) in historiography of American West. Recommended: 412.

HSTAA 416 American Law and the American Indian (3) I&S Relationship between Indians and the United States from 1789 to the present. Significant constitutional, legislative, and judicial actions. Legal events explored within their political, military, social, and cultural contexts. Comparisons with other minority-group experiences. Offered: jointly with LAW 467.

HSTAA 420 Farmers in United States History (5) I&S Kirkendall From pre-colonial practices to the modern agricultural system with emphasis on the demographic, geographic, and technological dimensions and their social, economic, and political implications. Prerequisite: a basic course in United States history.

HSTAA 426 American Urban History Since 1870 (3/5) I&S Development of American cities for the past century. Topics include physical development, immigration, politics, and changes in society and culture.

HSTAA 431 American Politics and Society Since 1920 (5) I&S Kirkendall Political, social, economic, and intellectual developments in the United States from 1920 to the present.

HSTAA 432 History of Washington and the Pacific Northwest (5) I&S Findlay, Saum, White Exploration and settlement; economic development; growth of government and social institutions; statehood.

HSTAA 436 American Jewish History Since 1885 (5) I&S Kieval Political, social, economic, and religious history of the American Jewish community from the period of the great eastern European migration until the present. The integration of the immigrant community into the general American community; the rise of nativism; the development of American socialism; World War I and World War II; and the reactions of the American Jews to these events.

HSTAA 445 Economic History of the United States (5) I&S McKenzie Growth and development of the United States economy from the colonial period to the present. Follows the course of economic change, examines contemporary reactions, and analyzes implications for

HSTAA 451 Constitution Making in America, 1776-89 (5) I&S Johnson Intensive study of the framing of the Articles of Confederation, the state constitutions, the territorial ordinances, the United States Constitution of 1787, and the Bill of Rights. Class discussions and term paper, in addition to required attendance at lectures offered in 351, which cover the English and colonial backgrounds and developments to 1840. Credit cannot be received for both 351 and 451.

HSTAA 454 The Intellectual History of the United States (5) VLPA/I&S Saum Lectures and discussions devoted to the development of the American mind, from historical beginnings to the present.

HSTAA 456 The American Character (5) I&S Explores prevailing explanations for the American character and tries to assess its historical consequences. Lectures, discussion, reading, reports. Recommended: two college-level courses in history, including study of the American people and of the people of at least one other modern nation or society.

HSTAA 458 History of American Education to 1865 (3) I&S Development of American education in cultural context: colonial period, influence of enlightenment, and common school movement. Offered: jointly with EDLPS 458.

HSTAA 469 History of American Education Since 1865 (3) I&S Development of American education in cultural context: progressive education, recent criticism, continuing issues and trends. Offered: jointly with EDLPS 459.

HSTAA 461 Diplomatic History of the United States, 1776-1901 (5) I&S Fowler Foreign policy of the United States government prior to the twentieth century. Emphasis on international wars, territorial expansion, and the peculiarities of the American position in world politics. Prerequisite: 202 or graduate standing.

HSTAA 462 Diplomatic History of the United States, 1901-Present (5) I&S Fowler Foreign policy of the United States government during the twentieth century. International wars and the other major episodes in diplomacy are emphasized. Prerequisite: 202 or graduate standing.

HSTAA 470 Colloquium in American History: the Progressive Era, 1900-1917 (5) I&S Glenn The principal problems and themes of the Progressive Era, emphasizing political, economic, social, and cultural aspects. Permission of instructor required.

HSTAA 471 Colloquium in American History: the 1920s in America (5) I&S Achievements and issues of the New Era; causes and consequences of the stock-market crash and Great Depression, with emphasis on political, economic, social, and cultural analysis. Permission of instructor required.

HSTAA 472 Colloquium in American History: Franklin D. Roosevelt and the New Deal (5) I&S Analysis of the key political, economic, social, and cultural factors in the New Deal, including the role played by President Roosevelt. Permission of instructor required.

HSTAA 473 Colloquium in History: the American Experience in World War II (5) I&S Pease Problems and policies of the people of the United States and their government in World War II; the role of the United States in winning the war; impact of the war on American society. Permission of instructor required.

HSTAA 480 Labor and Popular Movements in Latin America (5) I&S Bergquist Interdisciplinary approach to origins and trajectory of labor movement from late nineteenth century to present. Emphasis in contemporary period on popular movements, including neighborhood associations, religious base communities, women's movement, and ethnic mobilization for democratic social and political reform. Recommended: at least two non-English language Latin American Studies courses. Offered: jointly with SISLA 480.

HSTAA 482 The History of Brazil: Colonial Period to the Present (5) I&S Alden Colonial foundations; the first and second empires; the old and new republics; current problems; prospects for the future.

HSTAA 483 Southern South America (5) I&S History of the four countries that form southern South America: Argentina, Uruguay, Paraguay, and Chile, focusing on economic, social, and political change in the nineteenth and twentieth centuries. Governments of Juan Perón in Argentina and Salvador Allende in Chile. Relations of the four countries with Europe and the United States.

HSTAA 486 History of Mexico: Colonial Origins to 1822 (5) I&S Gil Political, social, and economic history of Mexico from its discovery by the Spanish to its independence from Spain.

HSTAA 487 History of Mexico: 1822 to the Present (5) I&S Gil Political, social, and economic history of Mexico from its independence from Spain to the present. Recommended: 486.

HSTAA 488 History of the Caribbean and Central America (5) I&S Gil Political, social, and economic

history of principal countries in the Caribbean and Central America from their discovery to the present.

Ancient and Medieval History, Including Byzantine

HSTAM 201 Ancient History (5) I&S Ferrill, C. Thomas Development and characteristics of ancient Greek civilization from the Bronze Age to the Roman conquest. Emphasizes interaction of cultures of the eastern Mediterranean.

HSTAM 202 Ancient History (5) I&S Ferrill, C. Thomas Political, social, economic, and cultural development of Rome from the beginnings in the eighth century BC to the beginning of the Middle Ages.

HSTAM 203 Introduction to the Middle Ages: Medieval People (5) I&S Stacey Introduction to the Western Middle Ages through a study of social roles and statuses as seen through documents and imaginative literature. The groups studied are rulers, aristocracy, peasants, townspeople, clergy, outcasts, and outsiders.

HSTAM 205 Military History of the Ancient World (5) I&S Ferrill Military history from prehistoric times to the fall of the Roman Empire, with special emphasis on the Greco-Roman period and the campaigns of Alexander the Great, Hannibal, Scipio Africanus, and Julius Caesar.

HSTAM 301 Greek History: 7000 BC to 1000 AD (5) I&S Thomas Ancient Greece from its Neolithic village origins through the Bronze Age civilization and that of the Classical period, continuing with developments during the battles of Alexander's successors, Greece's incorporation into the Roman Empire, and its new form in the Byzantine Empire.

HSTAM 330 The Age of Augustus (5) VLPA/I&S Gowing Detailed study of the history and culture of the reign of Augustus, the first Roman emperor (31 BC-AD 14). Includes readings in Augustan authors such as Virgil, Ovid, and Horace as well as the study of Augustan art and architecture. Offered: jointly with CLAS 330.

HSTAM 331 Early Middle Ages (5) I&S Stacey The Dark Ages, feudalism, emergence of the medieval order of civilization, and the development of Romanesque culture.

HSTAM 332 Central Middle Ages (5) I&S R. Stacey Europe in the central Middle Ages: culture of cathedrals and universities, formation of national states, development of urban society.

HSTAM 333 Late Middle Ages (5) I&S B. Stacey Disintegration of the medieval order under the impact of the national state, the secularization of society, and the decline of the church. Movements of reform and revolution. The culture of late gothic Europe.

HSTAM 336 The Humanist Ideal: From the Greeks to the Renaissance (3) I&S Ferrill, O'Neil, C. Thomas Students read certain ancient, medieval, and Renaissance texts, selected to show the continuity and the transformations of the humanistic tradition, and write periodic essays on their reading as well as a term paper. Intended to supplement courses on the history of the respective periods.

HSTAM 340 Medieval Women (5) I&S Stacey The experiences of women in medieval society: public and private power, changing concepts of family and the domestic sphere, ideal and reality in courtly love, women in religious life, women in the workplace, the querelle des femmes and the beginnings of "feminist" thought.

HSTAM 342 Celtic Britain and Ireland (5) I&S Stacey Ireland, Scotland, and Wales in the early Middle Ages: Celtic religion and mythology, interaction between Christian culture and native traditions, sacred kingship and the formation of "nations,"

Arthurian fact and fiction, Celtic art, the Norman conquests of the Celtic "fringe."

HSTAM 351 Medieval Italy (5) I&S *O'Neil* Italy, from the barbarian invasions to the Renaissance, considered in the framework of European and Mediterranean cultures.

HSTAM 360 Medieval Christianity (5) I&S *Stacey* Development of Christianity in the medieval west circa 400 to 1500. Emphasis on the forms of religious life: monasticism, the papacy, friars, hermits, mystics, and reformers; and on the emergence of new modes of piety, both lay and clerical.

HSTAM 401 Early Greece (5) I&S *Ferrill, C. Thomas* Bronze and Dark Age Greece: realities of the heroic age of ancient Greece.

HSTAM 402 Classical Greece (5) I&S *Ferrill, C. Thomas* The classical civilization of ancient Greece, with special emphasis on the legacy of Greece to Western civilization.

HSTAM 403 Alexander the Great and the Hellenistic Age (5) I&S *Ferrill, C. Thomas* Rise of Macedonia, conquest of Near East by Alexander, and division into lesser kingdoms after Alexander's death. Special emphasis on fusion of cultures and change from city-state to world-state.

HSTAM 405 Topics in Ancient History (3, max. 6) I&S *Ferrill, C. Thomas* An umbrella course that makes it possible to treat a special topic in the history of the ancient world during the period from the Bronze Age to the fall of the Roman Empire. One topic is studied in depth during the quarter. Prerequisite: permission of instructor.

HSTAM 411 The Early Roman Republic (3) I&S *Ferrill* Political, social, economic, and cultural history, with emphasis on the development of the constitution and territorial expansions.

HSTAM 412 The Late Roman Republic (3) I&S *Ferrill* Political, social, and cultural history, with special emphasis on the period of Cicero and Caesar.

HSTAM 413 The Early Roman Empire (3) I&S *Ferrill* Political, social, economic, and cultural history, with emphasis on the Julio-Claudians.

HSTAM 414 The Late Roman Empire (3) I&S *Ferrill* Political, social, economic, and cultural history, with emphasis on the decline of ancient civilization.

HSTAM 421 The Byzantine Empire (5) I&S *Waugh* Political, social, economic, and cultural history of the eastern Roman Empire from the fourth to fifteenth centuries.

HSTAM 431 Topics in Medieval History, 500-1000 (5) I&S *Stacey* Study in depth of one or more topics in the history of Europe during the early Middle Ages. Prerequisite: a course in medieval history.

HSTAM 443 Kievan and Muscovite Russia: 850-1700 (5) I&S *Waugh* Development of Russia from earliest times to the reign of Peter the Great.

HSTAM 446 Medieval Russian Chronicles (5) I&S *Waugh* History of Russian chronicle writing; study of the chronicles as literature and as historical sources, with emphasis on the latter. Prerequisites: reading knowledge of Russian and permission of instructor. Recommended: 443.

HSTAM 460 Medieval England, 1042-1485 (5) I&S *Stacey* Upper level survey of English history from the Norman conquest until 1485. Emphasis on political, social, and economic history, with special attention to the peculiarities of English development as these had emerged by 1485.

HSTAM 472 Intellectual and Religious History of the Later Middle Ages (5) I&S *Stacey* Selected topics in intellectual and religious history, 1250 to 1550. Concentration on Europe north of the Alps and

on philosophical and theological issues rather than on "humanism" and the history of scholarship. Most reading in original sources in translation. Prerequisite: appropriate background in medieval history or intellectual history.

History of Asia

HSTAS 201 Ancient Indian Civilization (5) I&S *Conlon* Religions, literature, philosophy, politics, arts, and history of India from earliest times to the Mughal empire.

HSTAS 202 Modern Indian Civilization (5) I&S *Conlon* The Islamic impact, British conquest, and contemporary India. Emphasis on the rise of nationalism, social organization, and contemporary life and history.

HSTAS 211 History of Chinese Civilization (5) I&S Intensive survey of Chinese civilization from earliest times to today. Introduces all students, including East Asian history majors, to the general sweep of Chinese history. Social, cultural, and intellectual developments.

HSTAS 212 History of Korean Civilization (5) I&S *Palais* From earliest times to the present. Development of Korean society and culture in terms of government organization, social and economic change, literature, and art. Offered: jointly with SISEA 212.

HSTAS 221 History of Southeast Asia (5) I&S *Sears* Surveys Southeast Asian civilizations at the outset of Western colonial rule; the colonial impact on the traditional societies of Burma, Thailand, Cambodia, Laos, Vietnam, Malaysia, Indonesia, and the Philippines; nineteenth- and twentieth-century nationalist and revolutionary movements; emergence of Southeast Asia as a region in the modern world. Offered: jointly with SISSE 221.

HSTAS 341 Japanese Civilization (5) I&S *Hanley* Japan's civilization, including its origins, government, literature, economic institutions, material culture, social organization, and religions in relation to the development of Japan as a society and nation. Offered: jointly with SISEA 341.

HSTAS 348 Alternative Routes to Modernity (5) I&S *Guy* Routes to modernity followed by non-Western societies between 1600 and 1900. Historical experiences of non-Western societies seen in the contexts of European history and of development theory. Primary sources and techniques for posing theoretical questions of historical data. Offered: jointly with SIS 348.

HSTAS 401 History of Ancient India (5) I&S *Conlon, Salomon* India in ancient times; emphasis on forms of political organizations and economic life, social organizations, and cultural developments.

HSTAS 402 History of Medieval and Mughal India (5) I&S *Conlon* Medieval India; emphasis on forms of political organizations and economic life, social organizations, and cultural developments.

HSTAS 403 History of Modern India to 1900 (5) I&S *Conlon* Modern India; emphasis on forms of political organizations and economic life, social organizations, and cultural developments.

HSTAS 404 History of Twentieth-Century India (5) I&S *Conlon* Analysis of the problems in the fields of social life, international and domestic politics, education, economics, and other areas that confront India today.

HSTAS 422 History of Tokugawa Japan (5) I&S *Hanley* Background to the unification of Japan in 1600; establishment of the Tokugawa political structure; and the social, economic, and cultural history of the period 1600-1868.

HSTAS 423 History of Modern Japan (5) I&S *Pyle* Political, social, economic, and cultural development of Japan from the late Tokugawa period to the

present with special emphasis on the cultural impact of the West.

HSTAS 424 The Emergence of Postwar Japan (5) I&S *Pyle* The making of modern Japan; World War II and surrender; American occupation; postoccupation rebuilding; emergence as an industrial power. Offered: jointly with SISEA 440.

HSTAS 431 Tibetan History (3) I&S *Van Der Kuip* Tibet from earliest times to the present. Emphasis on the status and relations of Tibet in Asian affairs and on the evolution of the political institutions of a lama-ruler state. Recommended: 211 or equivalent.

HSTAS 441 Economic and Social History of Japan to 1900 (5) I&S *Hanley, Yamamura* Lecture-seminar on Japanese economic and social history from 700 to 1900. Analyses of the rise and decline of the shoen system, the rise of commerce, social change, changes in the living standard, demographic changes, and the early phases of industrialization. Political and cultural developments as related to economic and social change. Offered: jointly with SISEA 441.

HSTAS 451 Chinese History: Earliest Times to 221 BC (5) I&S Preimperial China.

HSTAS 452 Chinese History: 221 BC to AD 906 (5) I&S Development of the imperial Chinese state.

HSTAS 453 Chinese History: AD 906 to 1840 (5) I&S *Chan*, The Wu, Tai, Sung, Yuan, Ming, and early Ch'ing periods.

HSTAS 454 History of Modern China (5) I&S *Guy* Political, economic, social, and intellectual history of China from 1800 to the present. Processes of modernization and revolution and relationship between them.

HSTAS 456 Topics in Chinese Social History (5) I&S *Guy, Thompson* Surveys major issues and approaches to the study of the role of the Chinese people in China's historical development. Historical focus of course varies with instructor. Prerequisite: appropriate 400-level course in Chinese history or permission of instructor. Offered: jointly with SISEA 456.

HSTAS 462 Southeast Asian History to 1800 (5) I&S *Sears* Absorption and modification of cultures (Indian and Chinese), religions (Islam, Buddhism, Catholicism), and peoples (northern European) by island and mainland-Southeast Asians. Main themes are cultural contact and the growth of states and peoples.

HSTAS 463 Southeast Asian History from 1800 to the Present (5) I&S *Sears* Post-eighteenth-century history of the present countries of Burma, Thailand, Cambodia, Laos, Vietnam, Malaysia, Singapore, Brunei, Indonesia, and the Philippines. Deals with colonial rule, emerging nationalism, and political independence. Investigates broad themes of social, economic, and cultural history.

HSTAS 465 The Vietnam Wars (5) I&S *Sears* Analyzes Vietnamese, Cambodian, and Laotian wars fought in Southeast Asia from 1946 to present. Examines how the Vietnamese managed to defeat both the French and Americans. Questions whether these wars were wars of independence, civil wars, or "proxy wars" in which local forces served the interests of great powers.

HSTAS 469 Topics in Southeast Asian History (5) I&S Introduces major issues within the history and culture of one country of Southeast Asia. Content varies. Topics may include religion, economics, colonialism, perspectives on gender, labor history, literatures, popular culture, and performing arts. Focuses on a different Southeast Asian country each time offered. Offered: jointly with SISSE 469.

HSTAS 481 History of Traditional Korea: Earliest Times to the Nineteenth Century (5) I&S *Palais* Korean history from earliest times to the modern period.

HSTAS 482 History of Modern Korea: 1860 to the Present (5) I&S *Palais* Traditional institutions and society, Japanese colonial rule, liberation and the Korean War, early Korean communist movement, and North Korea and South Korea since 1945.

Modern European History

HSTEU 220 Introduction to East European Studies (5) I&S *Felak* Introduction to the history of post-1945 Eastern Europe focusing on political, economic, social, cultural, and diplomatic issues. Countries surveyed include Albania, Bulgaria, Czechoslovakia, Hungary, Poland, Romania, and Yugoslavia. Offered: jointly with SISRE 220.

HSTEU 273 Women and Gender in Modern Europe (5) I&S Examines European women's changing social role and competing views of femininity from the Enlightenment to the end of the cold war. Special focus on the relationship of gender and politics and on the female body in bourgeois society, industrialization, imperialism, the welfare state, fascism, and the cold war.

HSTEU 275 Life in England (5) I&S *Behlmer, Levy* Social history of England from the Norman conquest to the present, seen through letters, autobiographies, novels, and plays of the time. Life of the ordinary inhabitant in the village and the manor house.

HSTEU 276 Celtic Civilizations of the European Middle Ages (5) I&S *Stacey* Introduction to the history and pseudo-history of medieval Ireland, Wales, Scotland, and Gaul. Topics include "Celtic" religion, mythology, social institutions, nationalism, and the relationship between history and myth. Particular attention to how historians "do" history in the absence of straightforward historical sources.

HSTEU 301 Early Modern European History: 1450-1648 (5) I&S *Bridgman, Levy, O'Neil* Political, social, economic, and cultural history from the late Renaissance to the Peace of Westphalia.

HSTEU 302 Modern European History: 1648-1815 (5) I&S *Bridgman, Hankins, O'Neil* Political, social, economic, and cultural history from the Peace of Westphalia to the fall of Napoleon.

HSTEU 303 Contemporary European History Since 1815 (5) I&S *Bridgman* Political, social, economic, and cultural history from the fall of Napoleon to the present.

HSTEU 304 Cultural History of Renaissance Europe (5) VLP/AI&S *Levy* Examination of Medicean Florence, late sixteenth-century France, Elizabethan England, and the baroque courts of the early seventeenth century as cultural centers. Includes analysis of painters such as Botticelli and Rubens; poets such as Ronsard and Donne; philosophers such as Pico and Montaigne; and playwrights such as Marlowe, Shakespeare and Lope de Vega.

HSTEU 305 European Witch Trials (5) I&S *O'Neil* Witchcraft and magical beliefs in Europe considered as a problem in intellectual, social, and legal history. Medieval background, systematization of witchcraft theory in fifteenth century; comparison of learned and popular beliefs; mechanisms of witch trials and inquisitorial procedure; the Faust legend; growth of skepticism and decline of witchcraft in seventeenth century.

HSTEU 369 The Destruction of European Jewry, 1933-45 (5) I&S *Kieval* History of anti-Semitism; dimensions of the Holocaust; the Holocaust organization and the victims' responses; reactions of world to events in Europe, allied policies, refugee policy, and American actions. Legal, historical, and sociological questions raised by these events. Offered: jointly with SISJE 369.

HSTEU 370 The Vikings (5) VLP/AI&S *Leiren* The Vikings at home in Scandinavia and abroad, with particular emphasis on their activities as revealed in

archaeological finds and in historical and literary sources. Offered: jointly with SCAND 370.

HSTEU 378 The Making of Contemporary France (5) I&S *Jonas* Historical origins and subsequent development of nine contemporary problems and characteristics of French government and politics, economy, and society. Prerequisite: FRENCH 203 or equivalent.

HSTEU 380 History of Scandinavia to 1720 (5) I&S *Leiren* Scandinavian history from the Viking Age to 1720, with an emphasis on the political, social, and economic development of Denmark, Norway, Sweden, Finland, and Iceland from the Middle Ages to the Enlightenment. Offered: jointly with SCAND 380.

HSTEU 381 History of Scandinavia since 1720 (5) I&S *Leiren* Scandinavian history from the Enlightenment to the Welfare State with emphasis on the political, social, and economic development of the modern Scandinavian nations of Denmark, Norway, Sweden, Finland, and Iceland. Offered: jointly with SCAND 381.

HSTEU 401 The Reformation (5) I&S *O'Neil* Origins of the disunity of Europe in the crisis of the sixteenth century with emphasis on the relations between religion and politics.

HSTEU 405 European Intellectual History: Eighteenth Century (5) VLP/AI&S *Toews* Development of the social sciences, moral theory, political theory, and religious thought in eighteenth-century Europe. Rationalism, empiricism, utilitarianism, and the sources of idealism.

HSTEU 406 European Intellectual History: Nineteenth Century (5) VLP/AI&S *Toews* Selected topics in intellectual history up to 1890. The philosophical consequences of the French Revolution, the development of idealism, conservatism, romanticism, and early socialist theory; positivism, the problems of historicism, new forms of Christian apologetics, utilitarianism in decline, liberalism as philosophy, the early Marx.

HSTEU 407 European Intellectual History: Twentieth Century (5) VLP/AI&S *Toews* Selected topics in the intellectual history of the late nineteenth and early twentieth centuries. The aftermath of Darwinism, the problems of methodology in modern social science, historicism and moral relativism, irrationalism in philosophy and social theory, revisionism in secular and orthodox religions.

HSTEU 410 The Renaissance: 1300-1580 (5) I&S *O'Neil* Conditions of Renaissance culture: Italian republics and despots, humanism, the classical ideal of the arts, Machiavelli and the foundations of modern political thought; the end of an era. Prerequisite: 301 or HIST 112.

HSTEU 411 Europe: 1814-70 (5) I&S *Bridgman* Development of Europe during the age of Metternich, the revolutions of 1848, and the emergence of new national states.

HSTEU 412 Europe: 1870-1914 (5) I&S *Bridgman* Impact of population increase and technological change on European society; stresses and strains in European life and outlook.

HSTEU 413 Europe: 1914-45 (5) I&S *Bridgman* Politics and society of Europe in the age of the concentration camp.

HSTEU 414 Europe Since 1945 (5) I&S Political, economic, and military developments in Europe under the impact of the Cold War.

HSTEU 415 Europe in the Six Years' War: 1939-45 (5) I&S *Bridgman* Inquiry to discover what the war of 1939-45 was about and what it did to more than five hundred million Europeans.

HSTEU 421 France: 1429-1789 (5) I&S *Jonas, O'Neil* Political and cultural history, from Joan of Arc

to the eve of the French Revolution. Villon, Rabelais, Montaigne, Molière, Voltaire, Rousseau, de Tocqueville.

HSTEU 422 The French Revolution and Napoleon: 1789-1815 (5) I&S *Jonas* Transformation of France under the Revolution of 1789; the Reign of Terror and Napoleon; the impact of the revolution and Napoleon upon Europe.

HSTEU 423 France Since 1814 (5) I&S *Jonas* Political, economic, and social history since the Congress of Vienna. Special emphasis upon the continuity of the revolutionary tradition.

HSTEU 431 Germany: 1648-1914 (5) I&S *Bridgman* Culture(s) and politics in central Europe from the end of the Thirty Years' War to the formation of the first German national state. Emphasis on the self-perception of societies and on the variety of interpretations of this period's history that are offered by different "schools" of historians.

HSTEU 432 Germany: 1914-1945 (5) I&S *Bridgman* Politics and society from the collapse of the Bismarckian empire to the collapse of Hitler's empire.

HSTEU 433 Central Europe: the Habsburg Monarchy, 1740-1918 (5) I&S *Kieval* Social, political, cultural history of Europe's second-largest state, from the reign of Maria Theresa to the dissolution of the empire at the end of World War I. Topics include: state formation, nineteenth-century revolutions, nationality conflicts, political radicalism and anti-Semitism, and literature and the arts.

HSTEU 434 Germany 1871-1989 (5) I&S *Society* and politics from Germany's first unification to its reunification; domestic and foreign policy; political, economic, social, and cultural developments; high emphasis on German society's self-perception and on the variety of interpretations of this period's history offered by different "schools" of historians.

HSTEU 435 World War I (5) I&S *Bridgman* European society on the eve of the war. War experience of the Europeans. Long term consequences of the war on European social, political, and economic institutions. Impact of the war on non-European world. The war in European literature.

HSTEU 439 Soviet Union Since World War II (5) I&S *Ellison* Domestic and foreign policy; political, economic, social, and cultural developments.

HSTEU 440 History of Communism (5) I&S *Ellison, Ramet* Communism from its origins in the Bolshevik faction of Russian social democracy to the present, treating the development of the ideology, the various communist parties, and the communist states. Prerequisites: two courses in modern European history or politics. Offered: jointly with SIS 440.

HSTEU 444 Imperial Russia: 1700-1900 (5) I&S *Waugh* Development of Russia from Peter the Great to Nicholas II.

HSTEU 445 Twentieth-Century Russia (5) I&S *Ellison* Russia and the USSR from Nicholas II to the present.

HSTEU 451 East-Central Europe Since 1342 (5) I&S *Felak* Focus on the lands of today's Poland, Czechoslovakia, Hungary, and Germany from the time they were great powers to the present. Traces the major changes in the fortunes of these lands in both local and international settings.

HSTEU 452 Eastern Europe Since 1918 (5) I&S *Felak* Poland, Czechoslovakia, Hungary, Romania, Yugoslavia, Bulgaria, and Albania, from the end of World War I to the present. Prerequisite: 451 or permission of instructor.

HSTEU 453 History of the Balkans, 1400 to the Present (5) I&S *Felak* Centuries of Ottoman rule

that produced a new basis for the reemergence of independent states in the nineteenth and twentieth centuries; history of these new states until the present.

HSTEU 454 Baltic History (5) I&S Overview of the history of the area occupied by the Baltic countries of Latvia, Lithuania, and Estonia. Emphasizes their emergence as modern European nation-states. Era from World War I to present treated in depth, including the historical role and present situation of non-Baltic peoples, particularly Russians.

HSTEU 461 Formation of the Spanish Nation: to 1700 (5) I&S Major political, economic, and cultural events leading to the creation of the Spanish nation under Ferdinand and Isabel.

HSTEU 462 Spain: 1700 to the Present (5) I&S Political, economic, and cultural attempts of Spain to adjust to capitalism, liberalism, and secularism.

HSTEU 464 The Jews in Spanish History (5) I&S Sephardic Jews in Spanish politics, economy, and culture, emphasizing the medieval Golden Age and the Inquisition. Offered: jointly with SISJE 464.

HSTEU 465 The Jews of Eastern Europe (5) I&S Kievan Jewish society in Poland, Russia, the Hapsburg Lands, and Romania from the late Middle Ages to the Holocaust. Recommended: introductory course in European or Jewish history. Offered: jointly with SISJE 465.

HSTEU 467 Medieval Jewish History (5) I&S Stacey Social and intellectual history of the Jews in western Europe to the fifteenth century. Jews under Islam and Christianity; the church and the Jews; the Crusades and their legacy; intellectual achievements; conflict and cooperation. Offered: jointly with SISJE 467.

HSTEU 468 Early Modern Jewish History, 1492-1789 (5) I&S Kieval Jews in the early-modern period. The Spanish expulsion in 1492 to the onset of political and social emancipation in western Europe and America. Recommended: introductory course in European or Jewish history. Offered: jointly with SISJE 468.

HSTEU 469 Enlightenment, Emancipation, Antisemitism: History of the Jews, 1770-1914 (5) I&S Kieval The Jewish experience in the modern world from the European Enlightenment to the First World War. Focus on the debates surrounding Jewish emancipation, the reception of Jews within European society, modern antisemitism, nationalist movements, mass migration, and war. Offered: jointly with SISJE 469.

HSTEU 470 The Jacobethan Age: England 1580-1630 (5) I&S Levy Emphasis on arts and society instead of the traditional kings, battles, and politics; the way people at all levels of society lived, in towns and in the countryside, within the bounds of the royal court or outside in the political wilderness. Classes on poetry, drama, music, architecture, painting, interior decoration, and some of the minor arts, as well as on demography and some of the traditional historical subjects. Not open for credit to students who have taken 471 or 472.

HSTEU 471 England in the Sixteenth Century (5) I&S Levy Political, administrative, and social history from Henry VII to Elizabeth I, with emphasis on the Reformation and its effects and on conditions of life in Elizabethan England. Not open to students who have taken 470.

HSTEU 472 England in the Seventeenth Century (5) I&S Levy Political, administrative, and social history from the accession of James I to the Glorious Revolution. Not open to students who have taken 470.

HSTEU 474 England in the Nineteenth Century (5) I&S Behlmer Political, social, and cultural development; the agrarian, industrial, and French revolutions; the rise of parliamentary democracy; the Victorian age;

political thought from utilitarianism to Fabianism; Irish home rule.

HSTEU 475 England in the Twentieth Century (5) I&S Behlmer From the Boer War to the present; conservatism, liberalism, and socialism; England in two world wars; the decline of British imperialism.

HSTEU 476 Modern Irish History (5) I&S Behlmer Political and social history from 1800 to the present; the Irish Question after the Act of Union; development of Irish nationalism in the Home Rule and Sinn Féin periods; the Irish Free State and Northern Ireland since 1921; current problems in Northern Ireland.

HSTEU 480 European Socialism (5) I&S Jonas Origins and development of socialist theory and practice in Europe since the French Revolution. Socialism as a political movement. Prerequisite: at least one course in the history of Europe since 1789.

HSTEU 482 Fascism in Europe (5) I&S History of the fascist era in modern Europe from 1919 to 1945. A study of the principal examples of national fascism and fascist-like movements coupled with a general theoretical consideration of the phenomenon. Recommended: introductory course in the history of modern Europe.

Courses for Graduates Only

History

HIST 501 Ancient Greece and Rome: Writings and Interpretations (3-6) Thomas Study of historians, development of historical study as a distinct pursuit, focus of attention in historical scholarship in the ancient world and comparison with modern interpretation of antiquity.

HIST 502 Medieval Europe: Writings and Interpretations (3-6) O'Neil, Stacey, Stacey, Waugh Study of historians, schools of history, and interpretations of medieval European history.

HIST 504 Comparative Ethnicity and Nationalism (3) Kieval Theoretical approaches to, and historical case studies of, the phenomena of ethnicity, nationalism, and ethnic conflict in the modern world. Emphasis on Europe and Asia.

HIST 511 History of Science (3-6) Hankins

HIST 512-513-514 Seminar in the History of Science ([3-6]-[3-6]-[3-6]) Benson, Hankins

HIST 515 Field Course in the History of Technology (3) Hevly Introduces students to the literature, methodology, and problems of the history of technology, and prepares them for independent study in the field.

HIST 561 Islamic History (3-6) Bacharach Field course. Introduction to advanced study in the major periods and problems of Islam. Bibliographical guidance is stressed.

HIST 562 Ottoman History (3-6) Field course. Introduction to the major periods and problems of Ottoman history, 1300-1914, by acquainting the student with the major works in at least two languages. An attempt is made to teach some use of Ottoman materials. A minor problem is investigated in detail by every student. Prerequisite: knowledge of at least one major language besides English (French, German, Russian, or other).

HIST 563 Modern Near East (3-6) Bacharach Field course introducing the student to the major periods and problems of Near Eastern history, 1798 to the present. Prerequisite: permission of instructor.

HIST 571 Orientation to an Academic Career in History (3) Course for prospective college and university history instructors, preparing them for the non-academic aspects of their duties. Prerequisite: Master of Arts degree in history or permission of instructor.

HIST 580 Topics in History (3, max. 9) Seminar on selected topics in general history, with special emphasis on preparation for field examinations. Topics vary according to interests of students and instructor.

HIST 598 Methods of Historical Research (5) Exploration of new historical and scholarly techniques employed in historical research. Use of social science methodology and literary theory in the evaluation and interpretation of historical sources. Use of feminist theory, deconstruction, critical theory, and orality/literacy studies. Student research paper is based upon a chosen theoretical approach.

HIST 600 Independent Study or Research (*)

HIST 700 Master's Thesis (*)

HIST 800 Doctoral Dissertation (*)

History of the Americas

HSTAA 501 American History: Early (3-6) Johnson

HSTAA 503-504 Seminar in American History, Early ([3-6], max. 12)-[3] Rorabaugh Research seminar in early American history, 1600-1875.

HSTAA 512 American History: Western (3-6)

HSTAA 516 Hispanics of the United States (3-6, max. 6) Gil

HSTAA 521 American History: Writings and Interpretations, 1770-1870 (4-6) McKenzie, Rorabaugh

HSTAA 522 American History: Writings and Interpretations Since 1870 (4-6) Fowler, Glenn, Gregory, Kirkendall, Pease

HSTAA 524 American Social History Before 1860 (3-6) Field course. Survey of major problems and literature in American social history before 1860.

HSTAA 525 American Social History After 1860 (3-6) Glenn Field course. Survey of major problems and literature in American social history after 1860.

HSTAA 531 American History: Twentieth Century (3-6) Gregory

HSTAA 532-533-534 Seminar in American History: Recent Period ([3-6], max. 12)-[3-6], max. 12]-[3-6, max. 12])

HSTAA 550 African American History to Reconstruction (5) Comprehensive introduction to the major topics and writings in African American history from the colonial era to 1900, including the inception of slavery, free Blacks, slave revolts, Black abolition, Blacks in the Civil War and Reconstruction, and the Black female role in the struggle for freedom.

HSTAA 551 African American History Since Reconstruction (5) Comprehensive introduction to the major topics and writings in African American history in the twentieth century, including Jim Crow era, Black Women's Movement, Harlem Renaissance, legal origins of Civil Rights Revolution, Second Reconstruction, and Politics of Cultural Pluralism.

HSTAA 552-553 Graduate Seminar in African American History (3-3) Walter Research experiences and opportunities in African American history. Provides students with skills and methodology to pursue advanced research in the field.

HSTAA 554 American History: Intellectual (3-6) Saum

HSTAA 555-556 Seminar: American Intellectual History ([3-6]-[3-6]) Saum Develops research and writing competence in American intellectual history. Prerequisite: permission of instructor or graduate program coordinator.

HSTAA 561 History of American Foreign Policy (3-6) Fowler

HSTAA 562-563 Seminar in American Diplomatic History ([3-6]-[3-6]) *Fowler*

HSTAA 581 Latin American History: Colonial Period (3-6) *Alden*

HSTAA 582 Latin American History: National Period (3-6) *Alden, Bergquist, Gil*

HSTAA 583-584-585 Seminar in Latin American History ([3-6, max. 12]-[3-6, max. 12]-[3-6, max. 12]) *Alden, Bergquist, Gil* Problems of historical research in the history of Latin America from colonial beginnings to the present.

HSTAA 590 Topics in American History (3, max. 9) Seminar on selected topics in American history, with special emphasis on preparation for field examinations. Topics vary according to interests of students and instructor.

Ancient and Medieval History

HSTAM 501 Greek History (3-6) *Thomas* Problems in the history of the Athenian constitution.

HSTAM 511 Roman History (3-6) *Ferrill* Roman history, 31 B.C.-A.D. 37.

HSTAM 512-513 Seminar in Ancient History ([3-6]-[3-6]) *Ferrill, Thomas* Detailed study of special topics in ancient history. Prerequisite: permission of instructor or graduate program coordinator.

HSTAM 530 Early Middle Ages (3-6) *Stacey* Field course. Survey of early European history through the times of tribal migrations and invasions from Asia. Problems and methods of research. Prerequisite: permission of instructor.

HSTAM 531 Medieval European History (3-6) *B. Stacey*

HSTAM 532, 533 Medieval European Seminar (3-6, 3-6) *Stacey, Stacey* Prerequisite: reading knowledge of French or German or Latin.

HSTAM 535 Later Medieval Europe (3) *B. Stacey* Field course. Surveys European history from ca. 1250 to 1500, with particular attention to historiography. Prerequisite: permission of instructor. Recommended: reading knowledge of French or German.

HSTAM 536 Topics in Early Medieval History (3) *Stacey, Stacey* Graduate level study of specific topics in early medieval history. Topics vary from quarter to quarter; for information, please see instructor. Prerequisite: admission by permission of instructor.

HSTAM 590 Topics in Ancient and Medieval History (3, max. 9) Seminar on selected topics in ancient and medieval history, with special emphasis on preparation for field examinations. Topics vary according to interests of students and instructor.

History of Asia

HSTAS 501 Indian History (3-6) *Conlon* Prerequisite: permission of instructor.

HSTAS 502, 503 Seminar: History of India (3-6, max. 12; 3-6, max. 12) *Conlon* Seminar on selected topics and problems in the history of medieval and modern India. Prerequisites: 501 and permission of instructor.

HSTAS 520 Premodern Japanese History (5) *Hanley* Field course; Japanese history prior to 1868. Prerequisites: 421 and 422, or SISEA 441 and 541, or permission of instructor.

HSTAS 521 Modern Japanese History (3-6) *Pyle* Field course. Prerequisites: 422, 423, or permission of instructor.

HSTAS 530 Field Course in Southeast Asian History (3) *Sears* Introduction to major English-language works on Southeast Asian history and to the

major historiographical issues of the era.

HSTAS 541 Economic and Social History of Japan to 1900 (5) *Hanley, Yamamura* Analyses of land-holding systems, the rise of commerce, demographic changes, urbanization, early industrialization, and social change. Prerequisite: previous course work in Japanese history or economic history, or permission of instructor. Not open to students who have taken 441. Offered: jointly with SISEA 541.

HSTAS 532 Seminar in Southeast Asian History (3) *Sears* Selected topics in Southeast Asian history and historiography. Preparation for theses and doctoral dissertations on Southeast Asian History.

HSTAS 551 Field Course in Chinese History: Pre-Sung Period (3-6) Introduces Western language materials on traditional China in order to give the students bibliographical and other assistance in preparing for examinations in this field of history.

HSTAS 552-553-554 Seminar in Chinese History: Pre-Sung Period ([3-6, max. 12]-[3-6, max. 12]-[3-6, max. 12]) Prerequisite: reading knowledge of Chinese.

HSTAS 560- Field Course in Chinese History, Sung to Early Ch'ing ([3-6]-) First quarter of a two-quarter field course in Chinese history. Covers the Sung to Yuan period, 960-1368. Introduces Western materials on the history of this period to prepare graduate students for examinations in this field.

HSTAS 561 Field Course in Chinese History, Sung to Early Ch'ing (3-6) Second quarter of a two-quarter field course in Chinese history. Covers the Ming to the early Ch'ing period, 1368 circa seventeenth century. Introduces Western materials on the history of this period to prepare graduate students for examinations in this field.

HSTAS 562-563-564 Seminar in Chinese History: Sung to Modern ([3-6]-[3-6]-[3-6]) Professional writing seminar in Chinese history from Sung to modern times. Prerequisite: reading knowledge of Chinese.

HSTAS 571-572 Chinese History: Modern Period ([3-6]-[3-6]) *Guy* Field course in modern Chinese history, emphasizing extensive reading in the secondary literature on modern China.

HSTAS 573-574-575 Seminar in Chinese History: Modern Period ([3-6, max. 12]-[3-6, max. 12]-[3-6, max. 12]) *Guy* Research seminar in modern Chinese history. Training in the materials and methods of research, and preparation of extended research papers. Prerequisites: 571-572 or permission of instructor and reading knowledge of Chinese.

HSTAS 581 Modern Korean History (3-6) *Palais* Field course. Prerequisite: permission of instructor.

HSTAS 582-583-584 Seminar in Korean History ([3-6]-[3-6]-[3-6]) *Palais* Selected topics in Korean history and historiography.

HSTAS 590 Topics in Asian History (3, max. 9) Seminar on selected topics in Asian history, with special emphasis on preparation for field examinations. Topics vary according to interests of students and instructor.

Modern European History

HSTEU 501 Renaissance Field Course (3-6) *O'Neil* Topics in the cultural, political, and social history of the Renaissance era.

HSTEU 502 Reformation Field Course (3-6) *O'Neil* Topics in the religious, political, and social history of the Reformation era.

HSTEU 510-511-512 Core Seminar in the History of Modern Europe (3-3-3) An introduction to historiographical classics and exemplary new works in the various fields of modern European history. Members of

the seminar choose research topics and present the results of their research to the seminar.

HSTEU 515 Modern European Intellectual History (3-6) *Toews*

HSTEU 516-517 Seminar: European Intellectual History ([3-6]-[3-6]) *Toews*

HSTEU 521 Modern European History: France (3-6) *Jonas*

HSTEU 531 Modern European History: Germany (3-6) *Poiger*

HSTEU 532-533-534 Seminar in Modern European History: Germany ([3-6]-[3-6]-[3-6]) *Poiger*

HSTEU 544 Modern Russian History (3-6) *Young*

HSTEU 545-546-547 Seminar in Modern Russian History ([3-6]-[3-6]-[3-6]) *Ellison, Young* Prerequisite: reading knowledge of Russian and either French or German.

HSTEU 548 Field Course in Soviet History (3-6) *Ellison* Specialized course for graduate history students in the scholarly literature of Russian history since 1917. Intended for graduate students preparing for MA or Ph.D. field examination in Russian history of the Soviet period.

HSTEU 551 History of Eastern Europe: 1772-1939 (5) *Felak* Study of the east-central European region: Poland, Czechoslovakia, Hungary, Romania, and the Balkan countries, from their rebirth to World War II. Prerequisite: reading knowledge of German, French, Russian, or one East European language.

HSTEU 552 History of Eastern Europe: 1939 to the Present (5) *Felak* Prerequisite: reading knowledge of one major European or one East European language.

HSTEU 553-554-555 Seminar in Modern East European History ([3-6]-[3-6]-[3-6]) *Felak* Study and research involving special methods dealing with the histories of the East European countries in the modern period.

HSTEU 571 English History: Tudor and Stuart (3-6) *Levy*

HSTEU 572 English History (3-6) *Behlmer*

HSTEU 573-574 Seminar in Modern English History ([3-6]-[3-6]) *Behlmer*

HSTEU 575-576 Seminar in Tudor-Stuart History ([3-6]-[3-6]) *Levy* History of England under the Tudors and the Stuarts. Prerequisite: 571 or permission of instructor.

HSTEU 590 Topics in European History (3, max. 9) Seminar on selected topics in European history, with special emphasis on preparation for field examinations. Topics vary according to interests of students and instructor.

Honors

B102 Padelford

The honors program offers outstanding undergraduate students a special curriculum featuring small classes, challenging instruction, and close contact with faculty and other honors students. An emphasis on writing is incorporated into the honors core curriculum and honors seminars. Directed and independent study are particularly encouraged for upper-division students, commonly leading to a senior honors thesis or project.

For a description of honors program requirements, see the Undergraduate Study section of this catalog.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

H A&S 220, 221, 222 Science for Honors Students I,II,III (5, 5, 5) Evolution of an idea or concept central to the natural sciences. Intended for non-science majors. Content varies from year to year. For university honors students only. Offered: A, W, Sp.

H A&S 251, 252, 253 Western Civilization I,II,III (5, 5, 5) Introduction to ideas and society in Western Civilization. For university honors students only. Offered: A, W, Sp.

H A&S 261, 262, 263 World Civilization I,II,III (5, 5, 5) Introduction to ideas and society of civilization other than the Western. Specific civilization (Chinese, Japanese, Middle Eastern, South Asian) differs from year to year and section to section. For university honors students only. Offered: A, W, Sp.

H A&S 300 Introduction to the Professions (2-5, max. 15) Studies oriented toward professional work (law, medicine, public affairs). For university honors students only. Prerequisite: permission of honors office.

H A&S 350 Honors Seminar (2, max. 20) Discussion of selected topics in a variety of subject-matter fields. Topics and reading material vary from year to year. For university honors students only. Credit/no credit only. Prerequisite: permission of honors office.

H A&S 386 Interdisciplinary Special Topics—Natural Science (1-5, max. 10) Special courses drawn from interdisciplinary groups in the natural sciences. Content varies. Prerequisite: one sequence of honors core courses.

H A&S 397 Interdisciplinary Special Topics—Social Science (1-5, max. 10) Special courses drawn from interdisciplinary groups in the social sciences. Content varies. Prerequisite: one sequence of honors core courses.

H A&S 398 Interdisciplinary Special Topics—Humanities (1-5, max. 10) Special courses drawn from interdisciplinary groups in the humanities. Content varies. Prerequisite: one sequence of honors core courses.

International Studies

401 Thomson

The Henry M. Jackson School of International Studies organizes and supports interdisciplinary teaching and research in international affairs. The school consists of a group of interdisciplinary language and area studies programs on major world regions, as well as topical and comparative programs of study that transcend national and regional boundaries.

Undergraduate Program

Advisers

James Donnen, Linda Itlis
111 Thomson

Students may concentrate on a major world area within the context of the humanities and social sciences, specialize in topical studies, or pursue a more general course of study in international studies. For all the programs listed below, the student receives a Bachelor of Arts degree. Some programs also offer a minor. See adviser for requirements.

Canadian Studies

Anthony B. Chan, Chair

Canadian Studies offers a program that provides a broad understanding of Canadian society, culture and communications, historical development, and contemporary problems.

Bachelor of Arts

Major Requirements: 30 credits or second-year equivalent French language training; SIS 200, 201, 202; ECON 200, 201; SISCAS 356, 498; minimum 18 credits from approved Canadian Studies elective course list.

China Studies

David Bachman, Chair

China Studies offers a program that provides a broad understanding of the Chinese people and their culture, historical development, and contemporary problems. The program has particular strength in history and the social sciences.

Bachelor of Arts

Admission Requirements: Two quarters Chinese language; HSTAS 211; one upper-division course applicable to the major; 10 credits applicable to the major taken at the UW; minimum 2.00 overall GPA. Admission is competitive, based on GPA (emphasis on grades in courses related to program) and writing sample. Application deadline is the third Friday of each quarter; students are notified by the sixth Friday of the quarter in which they apply.

Major Requirements: 30 credits or second-year equivalent Chinese language training; additional training recommended. HSTAS 211; SISEA/HSTAS 212; SISEA/HSTAS 341; SISEA 455; 25 credits in 300- and 400-level courses on China include HSTAS 454, one course in premodern China, one course in Chinese arts and literature, and a 10-credit specialization in one of the three fields of modern China, premodern China, and Chinese arts and literature. Minimum 25 credits in upper-division required courses, including HSTAS 454, taken at the UW. Minimum 2.0 grade for all required courses.

Comparative Religion

Martin S. Jaffee, Chair

The Comparative Religion major introduces students to broad theoretical issues in the academic study of religion, and encourages them to explore these issues through mastering details of the textual canons, historical traditions, social contexts, and cultural forms of religion.

Bachelor of Arts

Major Requirements: RELIG 201, 202; RELIG/CHID 380; 35 supplementary credits in RELIG or non-RELIG prefix courses, of which at least 15 must be at the 300 level or above, selected from the three rubrics of *textual canons, historical traditions, and social contexts and cultural forms*. The distribution must include at least 5 credits and no more than 20 credits in any particular rubric.

European Studies

Eugene Webb, Chair

The curriculum in European Studies prepares students to pursue careers requiring an understanding of all the forces, both material and cultural, contemporary and historical, that are shaping Europe today (north, south, east, and west), taking into account transitions involved in the post-Soviet era and the movement toward greater political, economic, and cultural integration among the various nations involved.

Bachelor of Arts

Major Requirements: 10 credits of a foreign language at the third-year level or beyond; 15 credits of core courses, including EURO 301 (5 credits), a survey course in modern Europe (5), and a cross-cultural or cross-disciplinary case study (5); one quarter (10 credits minimum) of foreign study; 15 credits from approved list of electives; EURO 490-491, Senior Research Seminar (10 credits). See adviser for specific course options.

Minor

Minor Requirements: Foreign language through the sixth quarter; 15 credits of core courses including EURO 301 (5 credits), a survey course in modern Europe (5), and a cross-cultural or cross-disciplinary case study (5); 10 credits from approved list of electives.

International Studies

Resat Kasaba, Chair

The general program in International Studies gives students a comprehensive and interdisciplinary perspective on world problems, plus an ability to analyze the subtle interactions of politics, economics, and culture within the global system.

Bachelor of Arts

Admission Requirements: Admission is competitive, based on overall GPA, grades in the social sciences, a written statement of goals, language background, and any international experience. Before applying, students must complete either ECON 200 or 201; and either SIS 200 or 201. Grades in these courses will be given special consideration. Application deadline is the third Friday of each quarter; students are notified by the sixth Friday of the quarter in which they apply. Sophomore standing is preferred.

Major Requirements: Foreign-language competency through the second-year college level; ECON 200, 201; SIS 200, 201, 202, 401, 495, 498; three or four upper-division courses in an approved track; three upper-division interdisciplinary courses in international studies; a major paper of approximately 25 pages to be completed in one of the courses in the student's approved track or in one of the approved interdisciplinary courses. Majors are required to maintain a GPA of at least 2.50, both overall and in the program, and to earn a minimum 2.0 grade in all required SIS-prefixed courses.

Japan Studies

Susan B. Hanley, Chair

The Japan program combines language training with interdisciplinary study. Courses are offered in interdisciplinary studies, economics, business, political science, anthropology, all periods of Japanese history, art, law, literature, and language.

Bachelor of Arts

Admission Requirements: Two quarters Japanese language; SISEA/HSTAS 341; one upper-division course applicable to the major; 10 credits applicable to the major taken at the UW; minimum 2.00 overall GPA. Admission is competitive, based on GPA (emphasis on grades in courses related to program) and writing sample. Application deadline is the third Friday of each quarter; students are notified by the sixth Friday of the quarter in which they apply.

Major Requirements: 30 credits or second-year equivalent Japanese language training; additional training recommended. HSTAS 211; SISEA/HSTAS 341; HSTAS 423; SISEA 451; 20 credits of 300- and 400-level courses in Japan studies from approved list. One additional background course (5 credits) in a field other than Japan studies, to be approved by the adviser. Minimum 25 credits in upper-division required courses, including SISEA 451, taken at the UW. Mini-

mum 2.0 grade for language and all other required courses.

Jewish Studies

Robert C. Stacey, Chair

Jewish Studies brings the major disciplines of the humanities and the social sciences to bear on the history and culture of the Jewish people. Courses in history, both modern and premodern, comparative religion, and Near Eastern languages and civilization enable the student to study the history of the Jewish people, their rich and varied culture, and the influence of this culture upon world civilizations.

Bachelor of Arts

Major Requirements: Second-year equivalent Hebrew language training; up to 15 credits of Hebrew language study may be applied toward the 55 minimum credits required for the major. RELIG 210 (5 credits); SISJE/HIST 250 (5); SISJE 495, Majors Seminar (5); 25 credits of other courses in the Jewish studies curriculum.

Minor

Minor Requirements: RELIG 210 (5 credits); SISJE/HIST 250 (5); 20 additional credits from HEBR 473 or any upper-division SISJE course except 495 and 499. 15 credits of the minor must be taken at the UW.

Korea Studies

James B. Palais, Chair

The Korea program combines language instruction with history, society, and interdisciplinary area training for students interested in the culture and history of Korea. The program focuses on Korea within the broader context of East Asia.

Bachelor of Arts

Major Requirements: 30 credits or second-year equivalent Korean language training; additional training recommended. HSTAS 211; SISEA/HSTAS 212; SISEA/HSTAS 341; HSTAS 481, 482, and SISEA/ANTH 448; 20 credits in 300- and 400-level courses on East Asia.

Latin American Studies

Cynthia Steele, Chair

The Latin American Studies major combines language study in Spanish and Portuguese with work in history, the humanities, and the social sciences. It provides a comprehensive, interdisciplinary understanding of this major world region, emphasizing themes such as economic development, popular movements, cultural analysis, and hemispheric relations. At the same time, it gives students the option to develop their own particular disciplinary and thematic interests.

Bachelor of Arts

Major requirements: 45 credits (or equivalent) foreign language training, to include either two years of Spanish and one year of Portuguese or two years of Portuguese and one year of Spanish; 30 credits from an approved list, to include 10 each from the following: history; literature and arts; economic, political, and social/cultural development; 10 elective credits from approved list; 5-credit interdisciplinary seminar, and 5 credits for SISLA 493, Senior Thesis.

Russian, East European, and Central Asian Studies

James D. West, Chair

The Russian, East European, and Central Asian program is designed for students who wish to pursue concentrated study of these regions within an interdisciplinary framework. The curriculum covers most aspects of the historical and contemporary development of Russia, the newly independent states of the former Soviet Union, East Europe, and Central Asia.

Bachelor of Arts

Major Requirements: A minimum of two years (30 credits, or equivalent proficiency—more is strongly recommended) of a relevant language, to be completed before taking the seminars in which the senior thesis is written; 15-20 credits of core courses including relevant surveys (for Russian focus, SISRE 243, 324; for Eastern Europe, SISRE/HSTEU 220; for Central Asia, SISRE 324 and SISRE/NEAR E 375 or equivalent) and a two-quarter sequence (SISRE 343, 457) leading to the writing of a senior thesis in which the relevant foreign language is to be used; 30-35 credits in 300- and 400-level courses in social sciences and humanities, approved by the program adviser. The normal pattern is for majors to focus on one of the major geographic regions covered by the program (i.e., Russia, East Europe, or Central Asia), but in consultation with the adviser, alternative combinations of courses may be approved.

South Asian Studies

Frank F. Conlon, Chair

The South Asian Studies program combines language instruction with history and interdisciplinary area training for students interested in Bangladesh, India, Nepal, Pakistan, Sri Lanka, or Tibet.

Bachelor of Arts

Major Requirements: 30 credits or second-year equivalent in one of the languages of South Asia (Hindi, Sanskrit, or Tibetan); 10 credits in the history of India; SISSA 498; 30 credits in the area from the following disciplines—anthropology, art history, Asian literature, comparative religion, economics, geography, history, linguistics, music, philosophy, or political science.

Southeast Asian Studies

John E. Butler, Chair

The Southeast Asian Studies program provides interdisciplinary area training and language instruction for students interested in the countries of Thailand, Vietnam, Indonesia, Malaysia, the Philippines, Burma, Laos, Cambodia, Singapore, and Brunei. The program emphasizes social science approaches to the study of Southeast Asian history, culture and society.

Bachelor of Arts

Major Requirements: 30 credits or second-year equivalent in a Southeast Asian language; 15 credits in required topic courses, including at least two from different disciplinary fields, chosen from SISSE/HSTAS 221, HSTAS 482; 463, SISSE/ANTH 314, 315, ANTH 352/RELIG 350, SISSE/POL S 343, SISSE 490; 5 credits from SIS 200, 201, 202; 25 additional credits in approved elective courses.

Graduate Program

The Jackson School offers six area studies programs that lead to a Master of Arts in International Studies degree. These include China Studies; Japan Studies; Korea Studies; Middle East Studies; Russian, East European, and Central Asian Studies; and South Asia Studies. Specific requirements vary from one program to another, but all stress interdisciplinary study within the context of the historical cultures, contemporary situations, and languages of the world areas. In addition, the Jackson School offers a program in Comparative Religion for the Master of Arts in International Studies.

The Jackson School also offers a general program in International Studies that concentrates on the interaction of international economic, political, and cultural processes with states and societies around the world. This program was developed in conjunction with several professional schools and is designed as a concurrent degree program.

Admission Requirements: Applicants must meet the requirements of the Graduate School: a 3.00 GPA in the last 90 quarter (60 semester) graded credits and a baccalaureate degree from an accredited university. Submission of the scores of the general Graduate Record Examination is required. Applicants must also meet the requirements of the specific Jackson School program to which they are applying. Most of them require or strongly recommend previous study of an appropriate foreign language.

Graduation Requirements: Students must meet Graduate School requirements for the Master of Arts, as well as individual Jackson School program requirements. Programs are designed to be completed in two years.

Financial Aid: Financial support is available in the form of Title VI Foreign Language and Area Studies Fellowships. Some Jackson School programs have additional fellowships available for specific areas of study. Graduate students are also eligible for a limited number of teaching or research assistantships and reader-ships.

Research Facilities (East Asia): Research and training facilities include the East Asia Library, with a comprehensive collection of manuscripts, books, and serials on China, Japan, and Korea. In addition, the University is affiliated with the Inter-University Program for Chinese Language Studies in Taipei, language programs in the People's Republic of China sponsored by the Council on International Educational Exchange, and the Inter-University Center for Japanese Language Studies in Yokohama, which provide intensive language training for advanced undergraduate and graduate students. The School has ongoing projects on China, Japan, and Korea in which advanced graduate students and recognized scholars from the United States and foreign institutions regularly participate.

See also descriptions of research facilities on Russia, East Europe, and Central Asia as well as South Asia under the appropriate headings below.

Correspondence and Information

Graduate Program Assistant
111 Thomson

China Studies

David Bachman, Chair

The China Studies program provides a broad understanding of the Chinese people and their culture, historical development, and contemporary problems. The curriculum emphasizes the attainment of facility in Chinese language, a grounding in history, and a familiarity with the approaches of the social sciences to China studies. The cultural aspects of China are covered through offerings of several departments, with special strengths in art history and literature. The breadth of offerings allows students to select courses to meet career goals in business, government, and other professions, or to prepare for further graduate study in an academic discipline.

Admission Requirements: See above under Graduate Program. While not required for admission, some previous study of Chinese language is highly recommended.

Graduation Requirements: Chinese language training through the third year; two seminars: SISEA 521-522 (5 credits each) plus 26 credits in discipline study related to China from at least two different disciplines; two seminar papers or a thesis; comprehensive oral examination.

Comparative Religion

Martin S. Jaffee, Chair

The Comparative Religion program leading to the Master of Arts in International Studies offers an interdisciplinary curriculum in the study of religion, with several choices for areas of concentration. The required core

seminars focus on methodology and comparative perspective in the study of religion. For the remaining course requirements, primary and secondary curricular concentrations are available in: Buddhism, Hinduism, Judaism, Islam, Christianity, and religion and culture; further secondary curricular concentrations are available in Greco-Roman religions, East Asian indigenous traditions, and African religious traditions. Most students should expect the program to require two years, due to language requirements.

Admission Requirements: See above under Graduate Program. The Comparative Religion faculty reserve the right to determine in each case whether an applicant has sufficient language preparation and background in the study of religion for acceptance into the program.

Graduation Requirements: Completion of the third year in a language of the primary sources in the chosen concentration, and first-year reading proficiency in a secondary foreign language necessary for reading published research (e.g., German, French); certification of basic competency in the history of world religions; RELIG 501-502; one course focused on historical relations between religious traditions; at least four courses in a major concentration and two in a minor; one or two final research paper(s); and a comprehensive examination including both oral and written segments.

International Studies

Resat Kasaba, Chair

The general program in International Studies provides students with broad knowledge and skills in analyzing international affairs. Designed for students entering a variety of professional fields, the program trains them in international and comparative studies in a multidisciplinary setting. Students are prepared to undertake sophisticated analyses of international affairs and typically will hold positions after graduation with the international divisions of federal and state governments, international divisions of banks, trading companies, policy study institutes, corporations with international operations, and international development and educational organizations. The program usually entails concurrent enrollment in a graduate professional degree program and adds approximately one year to the student's course of study.

Admission Requirements: See above under Graduate Program. Those applying concurrently to a professional program (Business Administration, Public Affairs, Marine Affairs, Forest Resources, Law, or Public Health and Community Medicine) must first be accepted by the professional school. For non-concurrent applicants, preference is given to those who have a professional interest, or previous professional experience or education. Prior study of a foreign language and preparation in intermediate-level microeconomics and macroeconomics are highly recommended.

Graduation Requirements: Japanese or Chinese language through the third year or any other modern foreign language through the second year; SIS 500, 501, and 502 (3 credits each); SIS 511-512 (3 credits each); SIS 591, 592, and 593 (1 credit each); courses in two of the following three fields: a regional studies field, a professional field, or a special topics field (minimum three classes—9 credits—for each field); two seminar papers and an oral examination. Students in concurrent graduate degree programs also must meet Graduate School requirements for the second degree.

Japan Studies

Susan B. Hanley, Chair

The graduate program in Japan Studies gives students in-depth knowledge of many facets of Japan and familiarity with Japanese society and culture. Course work helps students prepare for careers in business, government, journalism, teaching, and a wide variety of

professional fields. The program is specifically designed for students with bachelor's degrees in a discipline, who need language and interdisciplinary training on Japan to pursue their career goals, and as preparation for doctoral work in an academic discipline involving Japan for students who have had little or no training on Japan or in the language.

Admission Requirements: See above under Graduate Program. At least one year of prior training in Japanese language is strongly recommended.

Graduation Requirements: Japanese language training through the third year (15 credits minimum training at this university); SISEA 555 (6 credits) and SISEA 558-559 (5 credits each); 20 credits in discipline study of Japan to include at least one history course and one social science course; two seminar papers or a thesis and an oral examination.

Korea Studies

James B. Palais, Chair

The graduate program in Korea Studies offers courses in Korean language, history, and society. Regular offerings are supplemented by visiting faculty from political science, economics and economic development, folklore, and literature. The program emphasizes the study of Korea in the context of East Asian civilization and the modern world economy, not simply as a single country in isolation from its neighbors. The objective of the program is to provide students with a broad background which will be of use for further graduate study, or in a variety of professions such as teaching, business, and government.

Admission Requirements: See above under Graduate Program. Previous language training is recommended.

Graduation Requirements: Korean language through the third year of instruction (through the second year of instruction if the student is admitted with no previous language training); HSTAS 481-482, SISEA/ANTH 448 (5 credits each), and SISEA 585 (6 credits); 15 credits in discipline study of East Asia or international studies; two seminar papers; comprehensive oral examination.

Middle Eastern Studies

Ellis Goldberg, Chair

The Middle East program is designed for students who wish to study the region within an interdisciplinary framework, focusing especially on the social, political, economic, and legal structure of the Middle East. Students interested in an M.A. degree emphasizing literature and other humanistic aspects of the Middle East should inquire about the program in the Department of Near Eastern Languages and Civilization.

Admission Requirements: See above under Graduate Program. Although knowledge of a Near Eastern language is not a prerequisite for admission, applicants are generally expected to have had at least the equivalent of one year's study of the language in which they plan to concentrate. Students with no language training may wish to begin their language program in an intensive summer program.

Graduation Requirements: Three 3-credit or two 5-credit Middle Eastern language courses beyond the second year (native speakers as well as non-native speakers); a core undergraduate course such as NEAR E 210, Introduction to Islamic Civilization, or a survey of the Muslim Near East; three courses on the modern Middle East, in at least two of the following disciplines: history, political science, or international studies; an advanced course in Middle East literature, culture, or religious developments; one approved Jackson School course; two courses in one social science discipline or in one professional school other than courses taken for preceding requirements; advanced reading courses on the Middle East; a thesis or two seminar papers and a four-hour written examination.

Russian, East European, and Central Asian Studies

James D. West, Chair

Designed primarily for students with B.A. degrees in a discipline, the programs offer a background for professional pursuits in government, journalism, business, or teaching, or for those who plan to take advanced graduate study leading to the Ph.D. degree in a discipline. The program includes language training, a concentration of study in a chosen discipline, and a combination of courses in other disciplines that focus on the region. Students usually focus on one of the specific regions (Russia, Eastern Europe, Central Asia), although they may, with permission of the adviser, take courses on more than one region.

Admission Requirements: See above under Graduate Program. A prerequisite for all applicants is two years of college-level language courses or the equivalent; for Russian Studies the language must be Russian; for other regions of the former Soviet Union and East Europe, two years of a language of the region, or other relevant language.

Graduation Requirements: Including the two years required for entry, four years of a language of the region being studied or two years each of two relevant languages (four years of Russian required for Russian focus); SISRE 500, 501, and 502 (3 credits each); 30 credits in disciplines other than language, with 15-20 credits in a discipline of concentration and 10-15 credits in at least two additional disciplines; a thesis (9 credits of SISRE 700); a written examination in the discipline of concentration and an oral interdisciplinary examination.

Research Facilities

The University of Washington is a major center for research on Eastern Europe, Russia, and the other newly independent states of the former Soviet Union, notably the countries of Central Asia. In addition to extensive holdings in Russian and East European language materials, the library has one of the best Central Asian language collections in the country. The strengths of the program are complemented by strengths in East Asian and Middle Eastern Studies.

South Asian Studies

Frank F. Conlon, Chair

The South Asian Studies program has been designed for students whose career objectives involve teaching and research in a traditional discipline with geographical interests within South Asia (i.e., India, Pakistan, Sri Lanka (Ceylon), Bangladesh, Nepal, and Tibet); those planning to enter professional training programs (e.g., education, business administration, journalism, law, or public affairs); or students planning a career in government service (e.g., the foreign service) who wish to acquire a special understanding of the South Asia area.

Admission Requirements: See above under Graduate Program.

Graduation Requirements: Completion of the third year of a South Asian language to include at least 7 credits at the 400 level or above; SISSA 510 and 511 (5 credits each); 28 credits in discipline course work other than language, of which 18 must be directly related to South Asia; two seminar papers and a comprehensive oral examination.

Research Facilities

The University of Washington library holds an extensive collection of books and serials relating to South Asia. The library participates in the U.S. Library of Congress Public Law 480 program, which supplies current publications from India, Pakistan, and Sri Lanka (Ceylon); and is a member of the South Asian Microfilm Program of the Center for Research Libraries, providing access to a large collection of microfilm newspapers, journals, and documents on South Asia.

Faculty

Director

Jere L. Bacharach

Professors

Alden, Dauril * 1959; MA, 1952, PhD, 1959, University of California (Berkeley); Latin American history, comparative colonial history.

Augerot, James E. * 1960; MA, 1959, New Mexico Highlands University; PhD, 1968, University of Washington; Slavic linguistics, Romanian, Bulgarian.

Bacharach, Jere L. * 1967; MA, 1962, Harvard University; PhD, 1967, University of Michigan; history of the Middle East, Islamic.

Brass, Paul R. * 1965; PhD, 1964, University of Chicago; comparative politics (South Asia).

Butow, Robert J. C. * 1960, (Emeritus); PhD, 1953, Stanford University; East Asian diplomatic history.

Chirot, Daniel * 1974; PhD, 1973, Columbia University; modernization, political sociology, Eastern Europe.

Conlon, Frank F. * 1969; PhD, 1969, University of Minnesota; history of India.

Ellison, Herbert J. * 1968; PhD, 1955, University of London (UK); modern Russian history.

Haley, John O. * 1974; LL.B., 1969, Yale University; LL.M., 1971, University of Washington; comparative law (Japan).

Haney, Jack V. * 1965; DPhil, 1971, Oxford University (UK); medieval Russian literature, Slavic folklore.

Hanley, Susan B. * 1970; PhD, 1971, Yale University; premodern Japan.

Harrell, Stevan * 1974; PhD, 1974, Stanford University; family systems, demography, social evolution, religion, China, Taiwan.

Hellmann, Donald C. * 1967; PhD, 1964, University of California (Berkeley); Japanese politics and international relations.

Jackson, W. A. Douglas * 1955, (Emeritus); PhD, 1953, University of Maryland; Canada, political systems, nature and culture.

Jaffee, Martin S. * 1987; PhD, 1980, Brown University; rabbinic religion and literature in late antiquity.

Keyes, Charles F. * 1965; PhD, 1965, Cornell University; ethnic group relations, sociology of Theravada Buddhism, mainland Southeast Asia.

Lardy, Nicholas R. * 1983; PhD, 1975, University of Michigan; international economics and Chinese economic development and trade.

Legters, Lyman H. * 1966, (Emeritus); PhD, 1958, Freie University of Berlin (Germany); Russian and East European Studies.

Mah, Feng-Hwa * 1961, (Emeritus); PhD, 1959, University of Michigan; Chinese economy and foreign trade.

Micklesen, Lew R. * 1966, (Emeritus); PhD, 1951, Harvard University; Slavic linguistics.

Migdal, Joel S. * 1980; MA, 1968, PhD, 1972, Harvard University; state and society in the Third World; Middle East politics.

Palais, James B. * 1968; PhD, 1968, Harvard University; modern Korean history.

Pempel, T. J. * 1995; PhD, 1972, Columbia University; comparative politics in Japan.

Potter, Karl H. * 1970; PhD, 1955, Harvard University; South Asia, Indian philosophy, epistemology.

Pyle, Kenneth B. * 1964; PhD, 1965, Johns Hopkins University; modern Japanese history.

Ramet, Sabrina P. * 1983; PhD, 1981, University of California (Los Angeles); politics and history of former Yugoslavia, East European religion and culture.

Stacey, Robert C. * 1988; PhD, 1983, Yale University; medieval England, medieval Judaism, political and legal history.

Steele, Cynthia * 1986; PhD, 1980, University of California (San Diego); Latin American literature and society, narrative and feminist theory.

Sugar, Peter * 1959, (Emeritus); PhD, 1959, Princeton University; political and economic history of eastern Europe and Near East since the eighteenth-century.

Taylor, George E. 1939, (Emeritus); MA, 1928, LittD, 1957, University of Birmingham (UK); East Asian studies.

Townsend, James R. * 1968, (Emeritus); PhD, 1965, University of California (Berkeley); comparative government (China), politics of development.

Webb, Eugene * 1966; PhD, 1965, Columbia University; modern English, French, and German literature, comparative religion.

Williams, Michael A. * 1976; PhD, 1977, Harvard University; early Christianity and religions of antiquity.

Yamamura, Kozo * 1972; PhD, 1964, Northwestern University; economic development and economic history of Japan, comparative economic history.

Associate Professors

Anchordoguy, Marie C. * 1989; PhD, 1986, University of California (Berkeley); Japan's political economy; East Asian economic development.

Bachman, David M. * 1991; PhD, 1984, Stanford University; Chinese politics and foreign policy and China's political economy (1949-present); US-China relations.

Butler, John E. * 1985; PhD, 1985, New York University; entrepreneurship, technology and innovation, strategic management.

Chan, Anthony B. * 1990; PhD, 1980, York University (Canada); history and politics of Pacific Rim communication systems, Canadian studies.

Coats, Herbert S. * 1968; PhD, 1970, University of Illinois; Slavic linguistics, Russian phonology, Russian syntax, Slavic accentuation.

Goldberg, Ellis * 1985; PhD, 1983, University of California (Berkeley); political economy of the Middle East, comparative politics.

Guy, R. Kent * 1980; PhD, 1981, Harvard University; modern Chinese history.

Jones, Christopher D. * 1984; PhD, 1975, Harvard University; post-Cold War security issues in Europe and East Asia, political economy.

Kaczynski, Włodzimierz M. * 1977, (Adjunct); PhD, 1972, University of Gdansk (Poland); fishery economics, international joint ventures in marine fisheries, international fisheries policy.

Kasaba, Resat * 1985; PhD, 1985, State University of New York (Binghamton); historical sociology, world systems, social change in the Middle East.

Keeler, John T. * 1980; PhD, 1978, Harvard University; comparative politics (Western Europe), international relations.

Kievel, Hillel J. * 1985; PhD, 1981, Harvard University; modern Jewish history, modern European history (Central and Eastern Europe).

Konick, Willis * 1950; PhD, 1964, University of Washington; Russian literature, nineteenth-century European literature.

Lavelly, William R. * 1985; PhD, 1982, University of Michigan; social demography of China.

Lukoff, Fred 1964, (Emeritus); MA, 1948, PhD, 1954, University of Pennsylvania; Korean language and linguistics.

Poznanski, Kazimierz * 1987; PhD, 1974, University of Warsaw (Poland).

Sorensen, Clark W. * 1989; PhD, 1981, University of Washington; Korea, social change in East Asia, development, ethnic identity.

Waugh, Daniel Clarke * 1972; PhD, 1972, Harvard University; medieval Russian history.

West, James D. * 1972; PhD, 1970, Cambridge University (UK); modern Russian literature, art and philosophy.

Assistant Professors

Sparke, Matthew 1995, (Acting); MA, 1991, PhD, 1996, University of British Columbia (Canada); human geography.

Whiting, Susan H. 1994; PhD, 1995, University of Michigan; international relations (China).

Young, Glennys J. * 1992; PhD, 1989, University of California (Berkeley); late Imperial and early Soviet Russia.

Lecturer

Engelmann, Kurt E. 1986; MA, 1988, PhD, 1993, University of Washington; geography of central Asia, human-environment interactions in the former Soviet Union.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

International Studies

SIS 200 States and Capitalism: The Origins of the Modern Global System (5) I&S *Kasaba, Migdal* Origins of the modern state system and of the world market in Europe. Interacting forces of politics and economics around the globe from the sixteenth century until World War II.

SIS 201 Introduction to International Political Economy (5) I&S *Jones, Migdal* International political economy through the examination of major facets of the post-World War II era. Analyzes the new postwar economic order and its crises in the 1970s and 1980s, North-South relations, the postwar political order and its East-West rivalry. Recommended: ECON 200.

SIS 202 Cultural Interactions in an Interdependent World (5) I&S *Guy* Cultural interaction among societies and civilizations, particularly Western versus non-Western. Intellectual, cultural, social, and artistic aspects; historical factors.

SIS 301 War (5) I&S *Chirot* Origins and conduct of war; readings from anthropology, political science, economics, and history, as well as novels and some recent works on the arms-control controversy. Modern forms of warfare, including guerrilla war, world war, and nuclear war. Offered jointly with SOC 301.

SIS 302 Intercultural Relations (5) I&S *Webb* Perspectives on foreign cultures through literary example. Interdisciplinary approaches to the study of culture as such and problems of intercultural relations. Prerequisite: 202 or ANTH 202.

SIS 330 Political Economy of Development (5) I&S *Poznanski* Growth, income distribution, and economic development in less-developed countries today. Policies concerning trade, industrialization, the agricultural sector, human resources, and financing of development. Prerequisites: ECON 200, 201.

SIS 332 Political Economy of International Trade and Finance (5) I&S *Poznanski* Theoretical and historical analysis to explore the causes and effects of the rise and decline of four major international trade

and monetary regimes. Foundations and emerging features of the new international trade and monetary regime and its implications for the world economy.

SIS 335 Geography of the Developing World (5) I&S Characteristics and causes, external and internal, of Third World development and obstacles to that development. Special attention to demographic and agricultural patterns, resource development, industrialization, and urbanization, drawing on specific case studies from Asia, Africa, and Latin America. Offered: jointly with GEOG 335.

SIS 340 Comparative Communism and Post-Communism (5) I&S Ramet Nature of politics in communist and post-communist systems, focusing on Soviet (Russian), Chinese, Yugoslav, and East German (German) cases. Relates communism to the broader subject of revolutionary transformation. Prerequisite: one previous course in international studies, political science, or history.

SIS 342 Social Theory in International Context (5) I&S Comparative, historical introduction to the foundations of modern social theory in the work of Max Weber, Sigmund Freud, and Claude Lévi-Strauss. Focus on tensions between universalist claims, European origins, and non-European applications of models of cultural formation and development.

SIS 348 Alternative Routes to Modernity (5) I&S Routes to modernity followed by non-Western societies between 1600 and 1900. Historical experiences of non-Western societies seen in the context of European history and of development theory. Emphasizes primary sources and techniques for posing theoretical questions of historical data. Offered: jointly with HSTAS 348.

SIS 360 Technology, Growth, and Competition (5) I&S Poznanski Discusses theoretical accounts of empirical findings on technological change (invention, innovation, diffusion) and factors behind technological change, e.g., market structure, business cycle, state policies. Analyzes the impact of technology on economic growth, i.e., productivity. Discusses the role of technology in foreign trade, particularly in the United States.

SIS 365 World Cities (5) I&S Factors that have propelled New York, London, and Tokyo into key positions in the organization of the late twentieth century international system. Asks historical and comparative questions and discusses the reasons behind the diminished position of cities such as Venice, Vienna, and Istanbul in that system.

SIS 375 Geopolitics (5) I&S Spatial aspects of international politics, with attention to perceptions of national space, the way states organize territory, and the strategic use of geography to advance state goals. Prerequisite: GEOG 100 or an introductory course in International Studies. Offered: jointly with GEOG 375.

SIS 390 Political Economy of Industrialized Nations (5) I&S Ingebritsen Theoretical bases of various political economic systems of industrialized nations. Several major issues these political economies currently face; usefulness and limits of economic analyses within broader perspective of political economy. Prerequisites: ECON 200, 201.

SIS 397 Junior Honors Seminar (5) I&S Designed to facilitate writing of honors thesis through methodological and bibliographical research. Required of honors candidates. Prerequisite: admission to Jackson School honors program.

SIS 399 Study Abroad—International Studies (1-5, max. 15) I&S For participants in study abroad program. Specific course content varies. Courses do not automatically apply to major/minor requirements.

SIS 401 International Political Economy (5) I&S Poznanski Establishment, maintenance, and decay of the post-1945 international economic order. Political economy of international trade, monetary relations,

inflation, and North-South relations. Prerequisites: 201 and ECON 200 and 201.

SIS 405 Political Economy of Religious Institutions (5) I&S Comparative study of Buddhist, Taoist, Christian, and Islamic religious institutions as political and economic phenomena. Impact of wealth and power on religious institutions or religious ideas. Temporal coverage from the formative period to the present. Prerequisite: one course on China, Japan, Middle East, or Europe.

SIS 406 Political Islam and Islamic Fundamentalism (5) I&S Study of resurgence, since mid-1970's, of political Islam and what has come to be called Islamic fundamentalism, especially in the Middle East. Topics include the nature and variety of political Islam today, causes and implications of the current resurgence, and comparison with previous resurgences. Offered: jointly with POL S 432.

SIS 419 Comparative Media Systems (5) I&S Giffard, Rivenburgh Provides students an understanding of policies that shape national communication processes and systems. Uses comparative analysis to identify both similarities and differences among media structures of nations at different levels of development. Primary emphasis on broadcast media. Offered: jointly with CMU 420.

SIS 421 National Security and International Affairs (5) I&S Jones Major military aspects of contemporary international politics. Uses and limitations of military capabilities for sustaining a stable international order and national security. Processes by which states detect and assess threats to their security; practice of deterrence; transfer of arms among states; pursuit of arms control. Recommended: course work in international relations.

SIS 422 The United States in the Contemporary International System (5) I&S Hellmann United States in the world: ways in which international circumstances shape the political-strategic, economic, and cultural dimensions of America's policy. Case studies from post-1945 period. Recommended: background course work in international relations or American foreign policy.

SIS 423 Practicing American Foreign Policy (5) I&S Develops familiarity with tools available to promote international objectives of the United States. International case studies selected to illustrate the diverse considerations inherent in the policy process and evaluate the strengths and weaknesses of the national institutions involved. Prerequisite 200, 201, and 202.

SIS 426 World Politics (5) I&S Caporaso, Modelski Nation-state system and its alternatives; world distributions of preferences and power; structures of international authority; historical world societies and their politics. Offered: jointly with POL S 426.

SIS 432 Population and Modernization (3) I&S Hirschman, Lavelly Examines role of demographic factors in process of social modernization and economic growth. Approach is historical, focusing on populations of developed countries since 1700, and analytic, stressing attempts made by different disciplines to model demographic relationships, with attention to less developed regions. Prerequisite: SOC 331 or permission of adviser. Offered: jointly with SOC 432.

SIS 438 Ethnic Politics and Nationalism in Multi-Ethnic Societies (5) I&S Brass Provides a broad theoretical base, both descriptive and analytical, for the comparative study of ethnicity and nationalism. Examples drawn from ethnic movements in different societies. Some previous exposure either to introductory courses in political science or to courses in ethnicity in other departments is desirable. Prerequisite: junior standing. Offered: jointly with POL S 436.

SIS 440 History of Communism (5) I&S Ellison, Ramet Communism from its origins in Bolshevik fac-

tion of Russian social democracy to the present, treating the development of the ideology, the various communist parties, and the communist states. Prerequisites: two courses in modern European history or politics. Offered: jointly with HSTEU 440.

SIS 444 Peasants in Politics (5) I&S Young Interdisciplinary study of peasants, with special attention to questions of rural transformation. Peasant involvement in an increasingly independent world. Rebellion and revolution, impact of the international market, agricultural development. Offered: jointly with POL S 446.

SIS 449 Social Transformation of Modern East Asia (5) I&S Sorensen Comparative study of social change in China, Japan, Korea, and Vietnam since 1945. Concentration on small-scale social units in rural and urban areas under both communist and capitalist political systems. Prerequisites: two courses on East Asian history or society. Offered: jointly with ANTH 449.

SIS 450 Political Economy of Women and Family in the Third World (5) I&S Neuhauser Theoretical and empirical aspects of the political economy of women and the family in the Third World during the process of development, with a focus on labor. Main theoretical approaches examined and applied to case studies from Asia and Latin America. Offered: jointly with SOC 450.

SIS 455 Industry and the State (5) I&S Builds on states and markets approach of 200 and 201 through specific examination of effects of industry and industrial structure on political outcomes and roles of state. Emphasis on late-developing and newly developing economies. Prerequisites: 200, 201.

SIS 456 State-Society Relations in Third World Countries (5) I&S Bachman, Kasaba, Townsend Relationships among political, social, and economic changes in Asia, Africa, and Latin America. Problems of economic and political development, revolution and reform, state-society relations, imperialism and dependency. Offered: jointly with POL S 450.

SIS 465 Deeply Divided Societies (5) I&S Migdal Ethnic conflict seen from two perspectives: 1. the study of theoretical approaches as a means of understanding deeply divided societies; 2. a focus on one or more specific conflicts. Prerequisite: 201 or POL S 204.

SIS 467 Nations and States in the Modern World (5) I&S Development of national consciousness in the "old nations" of Europe before the French Revolution. Replacement by the new nationalism and its spread into East Central Europe, Russia, Ibero-America, Asia, and Africa. Offered: jointly with HIST 467.

SIS 476 Comparative International Political Economy (5) I&S Comparative analysis of four major approaches to international political economy: mercantilism, Marxism, liberalism, and evolutionary approach. Focus on international cooperation, social change, and economic institutions. Theoretical analysis of the four paradigms and applications to historic and current issues in international political economy: hegemonic cycle, post-communist transition, and cross-national income inequality.

SIS 480 The Catholic Church in World Politics (5) I&S Ramet Acquaints students with the self-identity, theology, ecclesiology, and political role of the Catholic Church in the contemporary era, with emphasis on its role in the United States, the USSR, China, Eastern Europe, and Latin America. Prerequisites: two courses in either world politics or comparative religion.

SIS 490 Special Topics (1-5, max. 15) I&S Content varies from quarter to quarter.

SIS 491- Senior Honors Seminar (5) I&S Study of issues related to students' thesis topics. Develops thesis-writing skills. Open only to Jackson School honors students.

SIS 482 Senior Honors Seminar (-5) I&S Students write a senior thesis working with their individual writing advisers.

SIS 495 Task Force (5) I&S Small-group seminars address current problems in international affairs, each focusing on one specific policy question and producing a joint task force report. Restricted to senior majors in International Studies. Prerequisites: 200, 201, 202, 401.

SIS 498 Readings in International Studies (5) I&S Reading and discussion of selected works of major importance in interdisciplinary international studies. Restricted to majors in International Studies.

SIS 499 Undergraduate Research (1-5, max. 15) Prerequisite: permission of instructor.

African Studies

SISAF 444 African Studies Seminar (3, max. 9) I&S Interdisciplinary seminar focusing upon one particular aspect of the African continent. Emphasis may be humanistic, social scientific, or historical. African Studies faculty and visiting scholars lecture on areas of their own expertise.

SISAF 499 Undergraduate Research (1-5, max. 15) Prerequisite: permission of instructor.

Canadian Studies

SISCA 308 Canada: A Geographic Interpretation (5) I&S Study of Canada; emergence of political-geographic and cultural entity and identity in North America that presents significant contrasts to the United States. Components that have helped shape Canadian earth-space and landscape. Offered: jointly with GEOG 308.

SISCA 341 Government and Politics of Canada (5) I&S Critical analysis of parliamentary institutions, political parties, and the federal system in Canada. Offered: jointly with POL S 341.

SISCA 356 Canadian Society (5) I&S Origins to the present in its North American setting; political development, cultural evolution, and emergence of multinationalism; economic base; arts and literature; problems of the environment; Canadian foreign relations.

SISCA 399 Study Abroad—International Studies (1-5, max. 15) I&S For participants in study abroad program. Specific course content varies. Courses do not automatically apply to major/minor requirements.

SISCA 424 Canadian Media Systems (5) I&S Structure and operation of Canadian mass media and telecommunications industries. Impact of United States media on Canadian culture. Role of domestic media in lives of minorities. Laws and policies governing communications. Offered: jointly with CMU 424.

SISCA 441 Québecois Literature (5) VLPA Readings of novels, plays, and occasionally, poetry. Special attention paid to how Québecois authors represent in their works the complex socio-political reality of their culture. Conducted in French. French majors required to read and write in French; all others may read and write in English. Prerequisites: FRENCH 303 and 306 or permission of instructor. Offered: jointly with FRENCH 441.

SISCA 490 Special Topics (1-5, max. 15) Content varies.

SISCA 495 Multiculturalism in Canada (5) I&S History of the multi-racial and multi-ethnic character of Canadian society. Impact of federal policy of bilingualism and multiculturalism. Current issues of language rights, retention of cultural heritage, self-government for aboriginal peoples, and improving race and ethnic relations.

SISCA 498 Seminar: Canadian Problems (5) I&S Major issues pertaining to Canadian society, government, and economic development.

SISCA 499 Undergraduate Research (1-5, max. 15) Prerequisite: permission of instructor.

China Studies

SISEA 101 Contemporary China (5) I&S Survey of the land and peoples, history, politics and foreign relations, economy, society, and culture of the People's Republic of China. Particular emphasis on current issues and policies. Designed for students with little or no background on China.

SISEA 399 Study Abroad—International Studies (1-5, max. 15) I&S For participants in study abroad program. Specific course content varies. Courses do not automatically apply to major/minor requirements.

SISEA 424 Perspectives on East Asia for Teachers (3, max. 6) I&S Substantive concepts, resources, and materials employed in teaching about East Asia. Requirements may vary in relation to the background of participants.

SISEA 434 Demographic Issues in Asia (3-5) I&S *Hirshman, Lavelly* Contemporary Asian countries face a number of issues with demographic components, including environmental and resource issues, ethnic rivalries, international migration, and public health. Addresses a set of these issues by focusing on the demography of one or more countries in Asia. Offered: jointly with SOC 434.

SISEA 445 Religion in China (5) I&S *Harrell* Religion in Chinese society, doctrines, practices, and social consequences of the eclectic folk religion, the elite Confucian, Taoist, and Buddhist traditions, syncretistic sects, and imported Christianity. Prerequisite: one course in Chinese society, politics, or history or permission of instructor. Offered: jointly with ANTH 447.

SISEA 446 Political Development in East Asia (5) I&S Comparative examination of political development in Japan and China from the nineteenth century to the present. Emphasis on theories of development and their applicability to the East Asian context. Prerequisite: one course in Chinese or Japanese history or in political development, or permission of instructor.

SISEA 449 Government and Politics of China (5) I&S Post-1949 government and politics, with emphasis on problems of political change in modern China. Prerequisite: junior standing. Offered: jointly with POL S 442.

SISEA 455 Undergraduate Colloquium on China (5) I&S Topics and readings vary but are usually drawn from interdisciplinary studies of modern China. Required for senior majors in Chinese regional studies, but open to other students with comparable backgrounds with approval of instructor.

SISEA 456 Topics in Chinese Social History (5) I&S *Guy* Surveys major issues and approaches to the study of the role of the Chinese people in China's historical development. Historical focus of course varies with instructor. Prerequisite: appropriate 400-level course in Chinese history or permission of instructor. Offered: jointly with HSTAS 456.

SISEA 464 Contemporary Society in the People's Republic of China (5) I&S Separate development of rural and urban social institutions in the People's Republic of China since 1949 from a sociological perspective. Family and marriage, social control, educational institutions. Dilemmas of contemporary China and reasons for institutional change. Offered: jointly with SOC 464.

SISEA 468 China's Economic Reforms: Integration Into World Economy (5) I&S *Lardy* A systematic survey of China's economic reforms since 1978,

including China's increasing integration into world economy. Prerequisite: ECON 493 or permission of instructor. Offered: jointly with ECON 468.

SISEA 470 Minority Peoples of China (5) I&S *Harrell* Interaction between China and the peoples of its periphery, including Inner Asia, Tibet, Northern Mainland, Southeast Asia, and aboriginal peoples of Taiwan. Emphasis on ethnicity, ethnic group consciousness, and role of the Chinese state. Prerequisite: one 200-level ANTH course or HSTAS 454 or ANTH 370. Offered: jointly with ANTH 470.

SISEA 490 Special Topics (1-5, max. 15) I&S Course content varies.

SISEA 499 Undergraduate Research (1-5, max. 15)

Comparative Religion

RELIG 201 Introduction to World Religions: Western Traditions (5) I&S *Jaffee, Webb, Williams* History of religions, concentrating on religious traditions that have developed west of the Indus. Primary attention to the Semitic religions (Judaism, Christianity, Islam) and to their ancient world background with emphasis on basic conceptual and symbolic structures.

RELIG 202 Introduction to World Religions: Eastern Traditions (5) I&S *Conlon, Cox* History of religions, concentrating on religions that have developed in South Asia and East Asia. Primary attention to Hinduism and Buddhism; other important Asian religions are discussed in relation to them, with emphasis on basic conceptual and symbolic structures.

RELIG 210 Introduction to Judaism (5) I&S *Jaffee* Basic ideas and motifs of Judaism: God, Covenant, Law, Life Cycle (birth, marriage, family life, sexual laws, role of women, death); Cycle of the Year (Sabbath, holidays, festivals); Holy Land, prayer, Messianism.

RELIG 211 Islam (5) VLPA/I&S Religious and cultural milieu of Arabia before Muhammad; Muhammad's call and struggles to establish the new faith; Qur'anic content and style; Western and Muslim scholarship and the Qur'an; place of traditions in the Islamic edifice; Muslim political and religious thought; sources of Muslim religious law; and modern Muslim movements. In English. Offered: jointly with NEAR E 211.

RELIG 212 Qur'an in English (3) VLPA/I&S Survey of the contents of the sacred scripture of Islam, regarded by Muslims throughout the world as the literal word of God. Treats Qur'anic narrative, law, theology, and ethics. Some attention also given to the Qur'an as an historical document and to Qur'anic scholarship by non-Muslims. Offered: jointly with NEAR E 212.

RELIG 220 Introduction to the New Testament (5) VLPA/I&S *Williams* Modern scholarly methods of research and analysis in dealing with New Testament books and their interpretation. Genres of various books (gospel, epistle, sacred history, apocalypse); problems of the relationships among author, material, and intended audience; relationships between theme and image.

RELIG 240 Introduction to the Bible: Old Testament (5) VLPA/I&S *Jaffee* Introduction to the Hebrew Bible in English. Results of modern critical studies on the Bible and the ancient Near East. Concentrates on the meaning of Biblical records in their own time and environment. Offered: jointly with NEAR E 240.

RELIG 301 Religious Thought Since the Middle Ages (5) I&S *Webb* Development of religious thought in the West from the Middle Ages to the twentieth century. History of focal ideas: God, man, knowledge, and authority during this period and the relation of changes in these ideas to the ways in which basic issues in religious thought have been conceived. Recommended: 201.

RELIG 322 The Gospels and Jesus of Nazareth (5) I&S *Williams* Gospel material from early Christian-

ity, including both canonical and noncanonical gospels. Relation of gospels to analogous literature from the Hellenistic-Roman period. Recommended: 220 or ENGL 310.

RELIG 324 The Emergence of Christianity (5) I&S Williams Studies stages in the development of Christianity as a new religion, during the first to fifth centuries CE, as the classical forms and institutions of Christian "orthodoxy" gradually achieved definition, and as this emerging Christian tradition became a dominant cultural and socio-political force. Recommended: 201, 220, or HIST 307.

RELIG 327 Eastern Christian Traditions (5) I&S Webb Eastern Christian traditions, with principal focus on Eastern Orthodox tradition in Byzantium and Russia from time of the Council of Nicea to the twentieth century. Considers significant differences between eastern and western Christianity and their doctrinal and cultural origins; explores distinctive features of eastern tradition. Prerequisite: 201 or HIST 307.

RELIG 350 Buddhism and Society: The Theravada Buddhist Tradition in South and Southeast Asia (5) I&S Keyes Religious tradition of Theravada Buddhism (as practiced in Sri Lanka, Burma, Thailand, Laos, and Cambodia). Variations in ethical orientations developed through Theravada Buddhist ideas. Recommended: 202 or knowledge of one Eastern religious tradition. Offered: jointly with ANTH 352.

RELIG 352 Hinduism (5) I&S Varieties of Hindu religious practice; the diverse patterns of religious thought and action among contemporary Hindus. Includes ritual behavior, village Hinduism, tantrism, sadhus, yoga, sects, the major gods and their mythologies, religious art, and the adjustments of Hinduism to modernity. Recommended: 202 or other study of South Asian culture.

RELIG 354 Buddhism (5) I&S Cox Buddhism as a religious way and as a way of thinking; the forms of Buddhism known in South Asia (India, Sri Lanka) and those introduced from there to Tibet and other parts of Central Asia. Includes the "Three Jewels" (i.e., the Buddha or Awakened Person, the Teaching [Dharma], and Community [Sangha]) around which Buddhism is traditionally articulated. Recommended: 202 or other study of Asian culture.

RELIG 380 The Nature of Religion and Its Study (5) I&S Jaffee, Webb Study of religion as a general human phenomenon. Manner in which different methods of inquiry (phenomenology, anthropology, sociology, psychology, literary criticism, archaeology, philosophy, theology) illuminate different aspects of religion and help to shape our conceptions of its nature. Recommended: 201 or 202 or other course in the history of religious traditions. Offered: jointly with CHID 380.

RELIG 399 Study Abroad—Comparative Religion (1-5, max. 15) I&S For participants in study abroad program. Specific course content varies. Courses do not automatically apply to major/minor requirements.

RELIG 400 The Jewish Mystical Tradition (5) I&S Jaffee Jewish esoteric thought from antiquity to early modern times. Emergence of Spanish Kabbalah. The thought of Isaac Luria and its immense influence in Jewish history through other movements—specifically the mystical messiah, Sabbetai Sevi, and the rise of Hasidism. Recommended: 201 or 210.

RELIG 405 Scripture in Judaism (5) I&S Jaffee Explores the phenomenon of religious interpretation of sacred books by attending to the destiny of the Bible as read within Judaism. Begins with the canonization of the biblical text itself and continues into the rationalist and mystical interpretive innovations of the Middle Ages. Recommended: 201, 210 and/or SISJE 250.

RELIG 410 Law in Jewish Experience (5) I&S Jaffee Place and function of law in Jewish social and

personal experience. Discusses the various ideological justifications of the law in biblical and rabbinic literature, examines representative texts, and explores theological reflection on law by medieval and modern thinkers. Prerequisite: 210. Recommended: 310 or 313.

RELIG 415 Modern Jewish Thought (5) I&S Jaffee, Kieval Major trends in Jewish religious thought since the European Enlightenment, focusing on encounters between Judaism and the modern world. Includes Haskalah; varieties of religious reform and accommodation; Zionism; socialism; the philosophy of Rosenzweig, Buber, and Kaplan; and theological responses to the Holocaust. Prerequisite: 210 or HIST/SISJE 250 or HSTEU/SISJE 469.

RELIG 420 The World of the Early Church (5) I&S Williams Early Christian church within the context of the Greco-Roman sociopolitical, philosophical, and religious environment. Covers the period from about AD 100 to 300. Christian thinkers and documents studied include both the classical "orthodox" and the "heretical." Recommended: 220, 324, or HIST 307.

RELIG 421 The Age of St. Augustine (5) I&S Williams Christian church in the fourth and fifth centuries as a major institution in the Roman Empire. Great figures of patristic theology, such as Athanasius, Gregory Nazianzus, Gregory of Nyssa, and Augustine. Recommended: 320, 324, or HIST 307.

RELIG 426 Gnosticism and Early Christianity (5) I&S Williams Impact of Gnosticism on the development of Christianity and several other religious groups of that period. Readings dating from the first through the third centuries AD. Recommended: 201 or 220, or HIST 307.

RELIG 428 Modern Christian Theology (5) I&S Webb Modern Protestant and Catholic thought since the nineteenth century: Kierkegaard, Barth, Bultmann, Rahner, Lonergan, and other major figures. Prerequisite: 301.

RELIG 442 Art, Religion, and Politics in the Early Christian Period, 300-700 AD (3) VLPA/I&S Kartsonis Evolution of the art of the early Christian period (300-700 AD) in the context of contemporary religious, political, and cultural developments. Offered: jointly with ART H 452.

RELIG 443 Art, Religion, and Politics in Byzantium, 700-1453 AD (3) VLPA/I&S Kartsonis Evolution of the art of Byzantium (700-1453 AD) in the context of contemporary religious, political, and cultural developments. Offered: jointly with ART H 453.

RELIG 446 Greek and Roman Religion (3) VLPA/I&S Harmon, Langdon Religion in social life of Greeks and Romans; emphasis on their public rituals and festivals. Priesthoods, personal piety, rituals of purification and healing, and the conflict of religions in the early Roman Empire. Prerequisite: one course in ancient history, classics, or religious studies; 201 preferred. Offered: jointly with CLAS 445.

RELIG 449 Religious Movements: The Sociology of Cults and Sects (5) I&S Stark Understanding religion, what it is and what it does. Examines the formation of new religious movements, cults, and sects and the conditions under which they succeed or fail. Prerequisite: SOC 110. Offered: jointly with SOC 445.

RELIG 452 Topics in the Buddhism of Tibet (3) I&S Topics in the development of Buddhism of Tibet. Includes the relationship between reasoning and religious thought; the concept of a person; the formation of the different schools of Tibetan Buddhism; the notion of lineage; the master-disciple relationship in the tantric tradition. Prerequisite: 354 or permission of instructor.

RELIG 490 Special Topics (1-5, max. 15) I&S Topics vary with each offering. Prerequisites: 380 and permission of instructor.

RELIG 491 Seminar: Topics and Issues in Judaism (5) I&S Jaffee Topics vary. Recommended: 210.

RELIG 492 Seminar: Topics in Early Christianity (5) I&S Williams Topics vary. Recommended: one course in early Christian history or literature.

RELIG 498 Honors Thesis (5) I&S Required course for Comparative Religion honors students. Offered: AWSpS.

RELIG 499 Undergraduate Research (1-5, max. 15) Primarily for comparative religion majors and majors in the School of International Studies. Prerequisite: permission of instructor.

European Studies

EURO 301 Europe Today (5) I&S A multi-disciplinary approach to contemporary Europe focusing on social, political, cultural, and economic change, with special reference to developments in the countries of the European Union and those in Eastern Europe in the post-Soviet era.

EURO 425 European Media Systems (5) I&S Examines media systems in selected countries in Europe and policy issues that link (or divide) members of the European Union and other major media producers. Media studied in context of the contemporary economic, social, political, and cultural milieu in which they operate. Offered: jointly with CMU 425.

EURO 395 Supervised Internship (1-5) Prerequisite: permission of instructor.

EURO 399 Study Abroad (1-5, max. 15) I&S For participants in Study Abroad program. Specific course content varies. Courses do not automatically apply to major/minor requirements.

EURO 485 Family Change in Western Europe and the United States (5) I&S Lye Investigates patterns of recent family change. Explores similarities and differences in family life between Western Europe and US as well as variations among countries and among population subgroups within countries. Focuses on differences and similarities in social, economic, political, and cultural environments. Recommended: SOC 352. Offered: jointly with SOC 485.

EURO 490 Senior Seminar I (5) I&S Introduction to bibliographical resources for research into European topics and to the analysis of problems. Offered: W.

EURO 491 Senior Seminar II (5) I&S Writing and discussion of senior thesis. Prerequisite: 490. Offered: Sp.

EURO 498 Special Topics (1-5, max. 15) I&S

EURO 499 Undergraduate Research (1-5) Prerequisite: permission of instructor.

Japan Studies

SISEA 242 Introduction to Contemporary Japan (5) I&S Interdisciplinary introduction to Japanese culture, society, politics, economics, history, law, and literature. Focuses on the period since World War II.

SISEA 341 Japanese Civilization (5) I&S Hanley Japan's civilization, including its origins, government, literature, economic institutions, material culture, social organization, and religions, in relation to the development of Japan as a society and nation. Offered: jointly with HSTAS 341.

SISEA 399 Study Abroad—International Studies (1-5, max. 15) I&S For participants in study abroad program. Specific course content varies. Courses do not automatically apply to major/minor requirements.

SISEA 440 The Emergence of Postwar Japan (5) I&S Pyle The making of modern Japan; World War II and surrender; American occupation; postoccu-

pation rebuilding; emergence as an industrial power. Offered: jointly with HSTAS 424.

SISEA 441 Economic and Social History of Japan to 1900 (5) I&S Hanley, Yamamura Lecture-seminar on Japanese economic and social history from 700 to 1900. Analyses of the rise and decline of the shoen system, the rise of commerce, social change, changes in the living standard, demographic changes, and the early phases of industrialization. Political and cultural developments as related to economic and social change. Offered: jointly with HSTAS 441.

SISEA 442 Political Economy of Postwar Japan (5) I&S Anchordoguy Political and economic problems of Japan since 1945. Utility of competing theoretical approaches to analysis of government and economy of Japan. Policy-making processes and effects of policies adopted. Some knowledge of postwar Japan desirable. Recommended: 440.

SISEA 446 Political Development in East Asia (5) I&S Comparative examination of political development in Japan and China from the nineteenth century to the present. Emphasis on theories of development and their applicability to the East Asian context. Prerequisite: one course in Chinese or Japanese history or in political development, or permission of instructor.

SISEA 447 Anthropology of Modern Japan (5) I&S Examines the problem of modernity in Japan since the late nineteenth century, with emphasis on contemporary Japan. Critically addresses previous anthropological work concerning patterns of Japanese "culture." Particular focus on the influence of modern forms of power, media, and exchange in the construction of present-day Japan. Offered: jointly with ANTH 443.

SISEA 451 Undergraduate Seminar on Japan (5) I&S Anchordoguy Senior seminar. Discussion of advanced readings; writing of senior thesis. Prerequisite: fulfillment of most of program course requirements. Restricted to Japan regional studies seniors.

SISEA 473 Institutions in Contemporary Japan (5) I&S Anchordoguy Introduction to institutions, policies, and trends in contemporary Japan, with background on origins of modern Japanese state and impact of occupation. Examines policy-making process and various interest groups. Prerequisite: 341 or equivalent.

SISEA 475 Japanese Society (5) I&S Hanley Discusses rapidly changing Japanese society and history of its unique aspects. Readings and lectures in sociology, anthropology, economics, and politics; emphasis on Japanese search for cultural identity and prevalent interpretations of Japanese society and behavior. Prerequisite: 341, or background in Japan studies.

SISEA 478, 479 Readings in the Social Sciences in Japanese (3-5, 3-5) I&S Yamamura Introduction to articles and short works in economics, history, political science, and other social sciences. Assignments chosen from major Japanese monthlies and academic works. All readings in Japanese. Prerequisite: JAPAN 313 or equivalent, and permission of instructor.

SISEA 490 Special Topics (1-5, max. 15) I&S Course content varies.

SISEA 499 Undergraduate Research (1-5, max. 15)

Jewish Studies

(See also *Comparative Religion and Near Eastern Languages and Civilization*.)

SISJE 250 The Jews in Western Civilization (5) I&S Kieval History of the Jews from late antiquity to the present. Examines the relationship between Jewish communities and the larger societies in which they are found. Offered: jointly with HIST 250.

SISJE 369 The Destruction of European Jewry, 1933-45 (5) I&S Kieval History of anti-Semitism; dimensions of the Holocaust; the Holocaust organization and the victims' responses; reaction of world to events in Europe, allied policies, refugee policy, and American actions. Legal, historical, and sociological questions raised by these events. Offered: jointly with HSTEU 369.

SISJE 399 Study Abroad—Jewish Studies (1-5, max. 15) I&S For participants in study abroad program. Specific course content varies. Courses do not automatically apply to major/minor requirements.

SISJE 465 The Jews of Eastern Europe (5) I&S Kieval Jewish society in Poland, Russia, the Habsburg Lands, and Romania from the late Middle Ages to the Holocaust. Recommended: introductory course in European or Jewish history. Offered: jointly with HSTEU 465.

SISJE 467 Medieval Jewish History (5) I&S Stacey Social and intellectual history of the Jews in Western Europe to fifteenth century. Jews under Islam and Christianity; the church and the Jews; the Crusades and their legacy; intellectual achievements; conflict and cooperation. Offered: jointly with HSTEU 467.

SISJE 468 Early Modern Jewish History, 1492-1789 (5) I&S Kieval Jews in the early-modern period. The Spanish expulsion in 1492 to the onset of political and social emancipation in western Europe and America. Recommended: introductory course in European or Jewish history. Offered: jointly with HSTEU 468.

SISJE 469 Enlightenment, Emancipation, Antisemitism: History of the Jews, 1770-1914 (5) I&S Kieval The Jewish experience in the modern world from the European Enlightenment to the First World War. Focus on the debates surrounding Jewish emancipation, the reception of Jews within European society, modern antisemitism, nationalist movements, mass migration, and war. Offered: jointly with HSTEU 469.

SISJE 470 History of the Jews in the Twentieth Century (5) I&S Kieval Historical experience of the Jews since World War I in Europe, North America, and the Middle East under the impact of three developments: growth of mass-based American Jewish community, destruction of Jewish life in Central and Eastern Europe, and creation of the State of Israel. Offered: jointly with HIST 470.

SISJE 490 Special Topics (1-5, max. 15) I&S Content varies.

SISJE 495 Majors Seminar in Jewish Studies (5) I&S Jaffee, Kieval Enables majors in the Jewish Studies Program to gain a broader sense of the history of Jewish Studies as an organized field of academic inquiry. Explores the implications for Jewish Studies of its present setting within the context of the humanities and the social sciences.

SISJE 499 Undergraduate Research (1-5, max. 15) I&S Prerequisite: permission of instructor.

Korea Studies

SISEA 212 History of Korean Civilization (5) I&S From earliest times to present. Development of Korean society and culture in terms of government organization, social and economic change, literature, art. Offered: jointly with HSTAS 212.

SISEA 399 Study Abroad—International Studies (1-5, max. 15) I&S For participants in study abroad program. Specific course content varies. Courses do not automatically apply to major/minor requirements.

SISEA 439 Politics of Korea (5) I&S Korean politics in the twentieth century, treating political legacy of ancient regime, colonial period, Korean War, and the

politics of North and South Korea. Comparative treatment of both Koreas in light of the Chinese and Japanese experience. Includes the America-Korea relationship. Offered: jointly with POL S 439.

SISEA 448 Modern Korean Society (5) I&S Sorensen Social organization and values of twentieth-century Korea. Changes in family and kinship, gender relations, rural society, urban life, education, and industrial organization since 1900. Differences between North and South Korea since 1945. Prerequisites: 212 or permission of instructor. Offered: jointly with ANTH 448.

SISEA 490 Special Topics (1-5, max. 15) I&S Course content varies.

SISEA 499 Undergraduate Research (1-5, max. 15)

Latin American Studies

SISLA 355 Social Change in Latin America (5) I&S Neuhauser, Van den Bergh Problems of development and dependency in Latin America. Relations of power and production between social classes and ethnic groups, with special emphasis on Meso-America (Mexico, Guatemala) and the Andes (Peru, Bolivia). Prerequisite: introductory course in sociology, anthropology, political science, economics, or international studies. Offered: jointly with SOC 355.

SISLA 399 Study Abroad—International Studies (1-5, max. 15) I&S For participants in study abroad program. Specific course content varies. Courses do not automatically apply to major/minor requirements.

SISLA 480 Labor and Popular Movements in Latin America (5) I&S Bergquist Interdisciplinary approach to origins and trajectory of labor movement from late nineteenth century to present. Emphasis in contemporary period on popular movements, including neighborhood associations, religious base communities, women's movement, and ethnic mobilization for democratic social and political reform. Recommended: at least two non-English language Latin American Studies courses. Offered: jointly with HSTAA 480.

SISLA 485 Cultural Studies of Latin America (5) VLP/I&S Interdisciplinary exploration of connections among culture, identity, and power, and among popular, mass, and elite cultures in one or more regions of Latin America. Specific topics vary, but may include such problems as tradition, modernity, and postmodernism or national and resistance cultures. Offered: jointly with SPAN 485.

SISLA 486 Photography and Cultural Studies in Latin America (5) VLP/I&S Interdisciplinary senior seminar explores the connections between visual anthropology (ethnography through photography and film), documentary and art photography, and colonial and post-colonial discourse in Latin America during the twentieth century. Prerequisite: permission of departmental adviser. Offered jointly with SPAN 486.

SISLA 490 Special Topics (1-5, max. 15) I&S Content varies.

SISLA 492 Latin American Studies Seminar (5) I&S

SISLA 493 Senior Thesis (5) I&S

SISLA 499 Undergraduate Research (1-5, max. 15)

Middle Eastern Studies

SISME 210 Introduction to Islamic Civilization (5) VLP/I&S DeYoung Major developments in Islamic civilization from advent of Islam in seventh century to present. Islamic history, law, theology, and mysticism, as well as the politics, cultures, and literatures of the various Islamic societies. Offered: jointly with NEAR E 210.

SISME 399 Study Abroad—International Studies (1-5, max. 15) I&S For participants in study abroad

program. Specific course content varies. Courses do not automatically apply to major/minor requirements.

SISME 430 Economic Development of the Middle East (5) I&S Kasaba Comparative examination of economic development in the Middle East. Includes population growth, agrarian change, industrialization, foreign trade, capital flows, and fiscal and monetary policies.

SISME 431 Political Economy of Middle Eastern Petroleum (5) I&S Kasaba Role of Middle Eastern oil-exporting countries, international oil companies, and major oil-consuming nations in determination of supply and demand in the world petroleum market. Impact of oil upon economies of oil-exporting countries and the world economy.

SISME 432 The Middle East and the World Economy (5) I&S Kasaba Early nineteenth century to the 1980s. Production and export of agricultural and raw materials, extension of loans and investments by Europeans, commercial exploitation and export of oil as major phases of economic interaction. These phases and their political repercussions; their significance and consequences.

SISME 490 Special Topics (1-5, max. 15) I&S Content varies.

SISME 495 Trends in the Contemporary Middle East (3) I&S Perspectives on cultural, political, and other aspects of Middle Eastern societies. Focuses on background complexities rather than immediate political-military confrontations. Topics vary. Recommended: previous course work on Middle East. Offered: jointly with NEAR E 495.

Russian, East European, and Central Asian Studies

SISRE 140 Russia From the Tenth Century to the Present (5) I&S Waugh Russian political, social, and economic history from the tenth century to the present. Offered: jointly with HIST 140.

SISRE 220 Introduction to East European Studies (5) I&S Introduction to the history of post-1945 Eastern Europe focusing on political, economic, social, cultural, and diplomatic issues. Countries surveyed include Albania, Bulgaria, Czechoslovakia, Hungary, Poland, Romania, and Yugoslavia. Offered: jointly with HSTEU 220.

SISRE 243 Russian Civilization (5) I&S Waugh, Young Russia's civilization, including fine arts, literature, religion, and history; political, social, and legal institutions and thought in relation to the general development of Russian society from early times to 1917.

SISRE 324 Soviet and Post-Soviet Society (5) I&S Ellison, Young Social, cultural, political, and economic systems of the major nations which, until 1991, comprised the Soviet Union and are now independent states. Deals with period of full communist power and changes brought about by its demise.

SISRE 343 Seminar on Russia, Eastern Europe, Central Asia (5) I&S Required course for majors focusing on library research and paperwriting skills. Preparation for writing of senior thesis. Prerequisites: 220, 243, or 375 and 2 years or equivalent of relevant language study and permission of undergraduate adviser.

SISRE 345 Baltic Cultures (5) VLPA/I&S Cultures and peoples of Estonia, Latvia, and Lithuania. Baltic literature, music, art, and film in social and historical context. Traditional contacts with Scandinavia and Central and East Europe. Offered: jointly with SCAND 345.

SISRE 375 Turkic Peoples of Central Asia (3) I&S Cirtautas History of the Turkic peoples, AD 552 to present. Emphasis on current status of Turkic peoples in Central Asia. Geographical distribution, demographic data, reactions and adaptations to

changes resulting from the 1917 revolution. Turkic viewpoint on past and present developments. Offered: jointly with NEAR E 375.

SISRE 378 Russia and Asia (3) I&S Russian expansion into Central Asia. Russian and Soviet policies toward nationalities and relations with adjacent Asian countries.

SISRE 399 Study Abroad—International Studies (1-5, max. 15) I&S For participants in study abroad program. Specific course content varies. Courses do not automatically apply to major/minor requirements.

SISRE 405 Peoples of Russia (5) I&S Traditional cultural and social organizations of the various nationalities in Russia. Particular emphasis on peoples of Siberia. Role of traditional culture in shaping contemporary lifestyles in a multiethnic, diversified setting. Prerequisite: one 200-level ANTH course or permission of instructor. Offered: jointly with ANTH 405.

SISRE 410 Writers and Intellectuals of Central Asia (3) VLPA/I&S Covers modern native writers and intellectuals of Central Asia and compares them with writers educated before the revolution of 1917. Prerequisite: 375 or permission of instructor.

SISRE 416 Siberia and Central Asia (5) I&S Population, settlement, resource-use problems, agriculture, and industrialization of Northern and Central Eurasia.

SISRE 418 Eastern Europe: the Political Economy of the Region (5) I&S Poznanski Focus on the classical command-type economy and the most recent economic and political transition in Eastern Europe. Analysis of current institutional reform, privatization, and trade relations.

SISRE 424 Security Affairs of Russia and Eurasia (5) I&S Jones Surveys history of Soviet military and Soviet empire from 1917 to 1985, breakup of the USSR during 1985 to 1991, and the emergence of new security issues among those Eurasian states that formally constituted the national components of the USSR and its communist military allies.

SISRE 425 Ethnicity and Nationality in the USSR and Its Successor States (5) I&S Creation of the Soviet Union: Leninist and Stalinist approaches to the "national question." Contemporary processes of ethnic assimilation and dissimulation. Formation of national elites, rise of various forms of nationalism, position of religion in national cultures. Specific cases include Russian nationalism, Islam in Central Asia. Offered: jointly with ANTH 425.

SISRE 445 Politics and Society Eastern Europe (5) I&S Ramet Political and social issues in lands east of the Elbe, treating some historical problems but focusing particularly on developments since 1945. Includes all communist states of Eastern Europe and their successors. Prerequisite: one previous course in European politics or history. Offered: jointly with POL S 445.

SISRE 450 Survey of the Cultures of the Turkic Peoples of Central Asia (3) VLPA/I&S Nomadic and sedentary cultures of the Turkic peoples of Central Asia. Emphasis on languages, literature, and adherence to traditional modes of life. Offered: jointly with NEAR E 450.

SISRE 455 Marine Business Environment in Russia and Eastern Europe (3) I&S Kaczynski International marine business environment of Russia and the maritime nations of East Europe; their transition process from communist to free market economic systems. Covers aspects of doing business in marine-related fields such as shipping, fisheries, shipbuilding, ports, and land infrastructures, marine tourism, and water sports. Offered: jointly with SMA 455.

SISRE 457 Senior Colloquium (5) I&S Required for majors. Involves writing of senior thesis. Prerequisite:

343, two years of relevant language, and permission of undergraduate adviser.

SISRE 490 Special Topics (1-5, max. 15) I&S Topics vary.

SISRE 499 Undergraduate Research (1-5, max. 15)

South Asian Studies

SISSA 340 Government and Politics of South Asia (5) I&S Brass Comparison of problems of national integration and political development in India, Pakistan, and Ceylon. Offered: jointly with POL S 340.

SISSA 386 Introduction to the Philosophical Systems of India (5) I&S Potter Fundamental views of classical Indian philosophical schools on epistemology and metaphysics through readings in translation of basic works. Nyaya, Vaisheshika, Samkhya, Yoga, Jain philosophy, Vijnanavada and Madhyamika Buddhism, Advaita Vedanta, and later developments. Prerequisite: 210 or one course in philosophy. Offered: jointly with PHIL 386.

SISSA 399 Study Abroad—International Studies (1-5, max. 15) I&S For participants in study abroad program. Specific course content varies. Courses do not automatically apply to major/minor requirements.

SISSA 417 Political Economy of India (5) I&S Brass Analysis of relationships among processes of economic change, political institutions, and structures of political power in contemporary India. Includes contrasting approaches to Indian economic development, land reform, radical and agrarian political movements, and role of foreign aid. Offered: jointly with POL S 417.

SISSA 434 International Relations of South Asia (5) I&S Interrelationships of domestic, interstate, and extraregional forces and their effects upon the resolution or expansion of interstate conflicts in South Asia. Offered: jointly with POL S 434.

SISSA 490 Special Topics (1-5, max. 15) I&S Topics vary.

SISSA 498 Undergraduate Colloquium on South Asia (5) I&S Interrelationship of the various social science disciplines in the study of South Asian history and culture. Prerequisite: permission of instructor.

SISSA 499 Undergraduate Research (1-5, max. 15)

Southeast Asian Studies

SISSE 221 History of Southeast Asia (5) I&S Sears Surveys Southeast Asian civilizations at the outset of Western colonial rule; the colonial impact on the traditional societies of Burma, Thailand, Cambodia, Laos, Vietnam, Malaysia, Indonesia, and the Philippines; nineteenth- and twentieth-century nationalist and revolutionary movements; emergence of Southeast Asia as a region in the modern world. Offered: jointly with HSTAS 221.

SISSE 314 Civilization of Island Southeast Asia (5) I&S Pemberton Cultural, political, economic traditions of insular Southeast Asia, Indonesia, Malaysia, the Philippines. Early Indianized states; growing influence of Islam; Western European conquests; developed colonial societies, their legacies; modern nationalism, problems faced by newly independent states; important cultural continuities. Prerequisite: one 200-level International Studies or anthropology course, or permission of instructor. Offered: jointly with ANTH 314.

SISSE 315 Southeast Asian Civilization: Buddhist and Vietnamese (5) I&S Keyes Civilizations of Theravada Buddhist societies in Burma, Thailand, Cambodia, and Laos and in Vietnamese societies of Southeast Asia. Culture of tribal peoples who live on peripheries of these societies. Cultural transformations consequent upon the war in Indochina and resettlement of Indochinese refugees in United States. Offered: jointly with ANTH 315.

SISSE 399 Study Abroad—International Studies (1-5, max. 15) I&S For participants in study abroad program. Specific course content varies. Courses do not automatically apply to major/minor requirements.

SISSE 343 Politics and Change in Southeast Asia (5) I&S Government and politics in the countries of Southeast Asia, with attention given to the nature of the social and economic environments that condition them. Offered: jointly with POL S 343.

SISSE 469 Topics in Southeast Asian History (5) I&S Introduces major issues within the history and culture of one country of Southeast Asia. Content varies. Topics may include religion, economics, colonialism, perspectives on gender, labor history, literatures, popular culture, and performing arts. Focuses on a different Southeast Asian country each time offered. Offered: jointly with HSTAS 469.

SISSE 490 Special Topics in Southeast Asian Studies (2-5, max. 15) I&S Content varies.

SISSE 499 Undergraduate Research (1-5, max. 15) Prerequisite: permission of instructor.

Courses for Graduates Only

International Studies

SIS 500 Seminar: Origins of the Modern Global System (3) Kasaba, Migdal Development of global interdependence from the fifteenth century to World War II. Interrelationship of politics and economics. International political economy from contextual, institutional, and historical perspectives.

SIS 501 Seminar: International Political Economy (3) Poznanski, Yamamura Institutional and historical perspective on the international political economy, focusing on the developing interrelationship of politics and economics. Prerequisites: ECON 200, 201.

SIS 502 Seminar: Change and Stability in International Affairs (3) Jones Examines major differences in the nature of cultural and economic adaptation to the challenge of the West, as well as the tensions these differences have generated within particular societies. Regional phenomena in the context of powerful international forces.

SIS 511-512 Practicum: Methods in International Studies (3-3) Chiot Assumptions underlying leading methodologies for comparative study of societies and other large-scale social entities. Quantitative and nonquantitative methods illustrated by recent research. Recommended: course in introductory statistics.

SIS 522 Special Topics in Ethnicity and Nationalism (3, max. 6) Topics vary, but always focus on ethnic group relations and nationalism viewed from a broad, comparative, interdisciplinary perspective. Emphasis is heavily cross-cultural, and the geographical coverage world-wide. Prerequisite: graduate standing in any social science or education, or by permission of instructor.

SIS 534 International Affairs (3) Provides a broad understanding of international issues and United States policy. Students explore U.S. foreign policy and theories of major international actors in international trade, security, and strategic concerns, refugee policy, conflict resolution, development assistance, and the environment. Offered: jointly with PB AF 534/POL S 534.

SIS 542 Seminar: State and Society (5) Migdal Examines the mutually conditioning relationship between states and the societies they seek to govern. Studies states as large, complex organizations and their interactions with society on different levels. Shows that interactions on any level affect the nature of the state on other levels as well. Offered: jointly with POL S 542.

SIS 551 Comparative Administrative Systems (3) Methodological problems of research in comparative administration. Theoretical and substantive aspects of administrative systems in urban-industrial and developing nations. Offered: jointly with PB AF 551.

SIS 575 Geography in Politics (3, max. 6) Sparke Literature in political geography and related fields pertaining to state and interstate relationships. Offered: jointly with GEOG 576.

SIS 580 Teaching International Studies (2, max. 4) Migdal For current and prospective teaching assistants. Includes teaching writing, leading effective discussions, the art of evaluation, and teaching critical reading skills; videotaping of actual teaching sessions of participants in class. Credit/no credit only.

SIS 590 Special Topics (2-5, max. 10) Seminar. Course content varies. Offered occasionally by visiting or resident faculty.

SIS 591-592-593 Colloquium in International Studies (1-1-1) Migdal, Kasaba Required colloquium for first-year Master in International Studies (MAIS) students. Informal introduction to the faculty and major avenues of research in international studies. Credit/no credit only.

SIS 600 Independent Study or Research (*)

Canadian Studies

SISCA 507 Research Seminar: Canadian Problems (3, max. 6) Consideration of the spatial dimensions of Canadian socioeconomic, cultural, and political development, with emphasis on resource potentials and relations with the United States, Japan, and other important trading partners. Prerequisite: GEOG 308 or permission of instructor. Offered: jointly with GEOG 507.

SISCA 550 Special Topics (2-5, max. 10) Offered occasionally by visitors or resident faculty. Course content varies.

China Studies

SISEA 521-522 Seminar: Introduction to the Interdisciplinary Study of China (5-5) Harrell, Thompson, Townsend

SISEA 530 Seminar on China (3, max. 6) Chan, Harrell Problems of Chinese history. Prerequisite: permission of instructor.

SISEA 531 Chinese History: Research Methods and Bibliographic Guides (3, max. 6) Chan Introductory research seminar dealing with the methodological and bibliographical problems concerning all periods and aspects of Chinese history from the earliest times to the nineteenth century. Prerequisite: two years of classical or modern Chinese.

SISEA 532 The Chinese Political System (3) Examination of key approaches, interpretations, and secondary literature in the study of contemporary Chinese politics. Prerequisite: permission of instructor. Offered: jointly with POL S 532.

SISEA 533 Seminar on Contemporary Chinese Politics (3) Research on selected problems in contemporary Chinese politics. Prerequisite: 532 or permission of instructor. Offered: jointly with POL S 533.

SISEA 535 International Relations of Modern China (3-5) Foreign policy of the People's Republic of China: historical antecedents; domestic and international systemic determinants; and Chinese policies toward major states, regions, and issues. Prerequisite: a course on contemporary Chinese politics or history, or permission of instructor. Offered: jointly with POL S 535.

SISEA 543 Law in East Asia: China (3) Clarke Introduction to the basic institutions and processes of the Chinese legal system. Development and role of law

in both the traditional and contemporary periods. Offered: jointly with LAW B 541.

SISEA 553 Chinese Legal Tradition (3) Chan, Haley, Liu Concepts and principles of the legal tradition in China. Draws on primary and secondary sources in English and, for students with Chinese language competence, traces the concept and development of Chinese law as well as legal institutions in Chinese society. Offered: jointly with LAW B 553.

SISEA 590 Special Topics (5, max. 10) Seminar. Course content varies. Offered occasionally by visiting or resident faculty.

SISEA 600 Independent Study or Research (*)

SISEA 700 Master's Thesis (*)

Comparative Religion

RELIG 501 Approaches to the Study of Religion (5) Cox, Jaffee, Williams Major approaches employed by modern scholarship in the study of religion, including historical, phenomenological, anthropological, sociological, and psychological. Prerequisite: admission to the comparative religion MA track or permission of instructor.

RELIG 502 Religion in Comparative Perspective (5) Ellingson, Jaffee, Keyes Analysis of selected theme or symbols in relation to several different religious traditions. Topics vary. Prerequisite: admission to the comparative religion MA track or permission of instructor.

RELIG 520 Seminar On Early Christianity (5) Williams Problems in the history and literature of early Christianity.

RELIG 528 Christian Theology (5) Study of exemplary figures in the history of Christian religious thought. Prerequisite: 428.

RELIG 570 Religion and Literature (5) Webb The relation of religious thought to the study of imaginative literature. Includes both critical theory and practical criticism of exemplary texts.

RELIG 590 Special Topics (2-5, max. 10) Offered occasionally by visitors or resident faculty. Course content varies.

RELIG 600 Independent Study or Research (*)

Japan Studies

SISEA 540 Law in East Asia: Japan (4) Foote, Haley Basic institutions and processes of the Japanese legal system. Historical development and traditional role of law, reception of Western law, and cultural and structural factors that influence the function of law and legal institutions. Offered: jointly with LAW B 540.

SISEA 541 Economic and Social History of Japan to 1900 (5) Hanley, Yamamura Analyses of landholding systems, the rise of commerce, demographic changes, urbanization, early industrialization, and social change. Prerequisite: previous course work in Japanese history or economic history, or permission of instructor. Not open to students who have taken 441. Offered: jointly with HSTAS 541.

SISEA 548 Japanese Administrative Law (3) Haley Japanese public law system. Organization and role of bureaucracy in formulating, carrying out national policy; legal principles governing procedural, decision-making aspects; role of judiciary, judicial review. Introduces students with Japanese to basic sources for legal research. Open to students without Japanese. Offered: jointly with LAW B 548.

SISEA 549 Government Regulation of Business in Japan (3) Offered: jointly with LAW B 549.

SISEA 551 International Relations of Northeast Asia (5) Hellmann Comprehensive survey of con-

temporary international relations of Northeast Asia with emphasis on Russia, Japan, China, and the United States. A multidisciplinary approach placing contemporary problems in historical context, drawing on modern social science theories. In particular, the connections between defense and economics are examined. Prerequisite: permission of instructor.

SISEA 555 Introduction to Modern Japanese Studies (3-6) *Hanley* Interdisciplinary introduction to the study of Japan, with emphasis on historical development. Required seminar for first-year graduate students.

SISEA 558 Readings on Japan in the Social Sciences (5) *Yamamura* Seminar discussing articles in Japanese in economics, history, political science, and other social sciences. Assignments from major Japanese monthlies and academic works. Prerequisites: JAPAN 313 or equivalent and permission of instructor.

SISEA 559 Interdisciplinary Seminar on Japan (6) *Yamamura* Advanced readings in history and the social sciences. Prerequisite: permission of instructor.

SISEA 575 Seminar on Japanese Society (5) *Hanley* Interdisciplinary seminar with class-led discussions on readings from anthropology, history, sociology, and nondiscipline-specific articles on Japanese society. Prerequisite: background on Japan. Not open to students who have taken 475.

SISEA 590 Special Topics (5, max. 10) Seminar. Course content varies. Offered occasionally by visiting or resident faculty.

SISEA 600 Independent Study or Research (*)

SISEA 700 Master's Thesis (*)

Korea Studies

SISEA 585 Research Seminar: Modern Korea (3-6) *Palais* Advanced instruction in problems and methods of research in Korean history. Foreign language not required. Prerequisite: permission of instructor.

SISEA 600 Independent Study or Research (*)

SISEA 700 Master's Thesis (*)

Middle Eastern Studies

SISME 530, 531, 532 Reading Seminar on Middle East Studies (2, 2, 2) Middle Eastern historiography, Islamic law, Islamic theology, relations between the Middle East and the world economy, political structures, social movements in the Middle East. Credit/no credit only.

SISME 590 Special Topics (3-5, max. 10) Content varies.

SISME 600 Independent Study or Research (*)

SISME 700 Master's Thesis (*)

Russian, East European, and Central Asian Studies

SISRE 500 Interdisciplinary Seminar (3) Contemporary problems in the societal, political, and economic development of Russia and East Europe. Seminars are devoted to specific topics, such as comparative cultures and ethnic minorities; economic development and environmental degradation; comparative communism; problems of a similar interdisciplinary nature. Prerequisite: permission of instructor. Required of all first-year MA students.

SISRE 501, 502 Bibliography and Research Methods (3, 3) Introduction to bibliographic and other scholarly resources in field; development of research techniques. Some use of relevant language required. Required of all first-year MA students. Credit/no credit only.

SISRE 504 Approaches to East European Politics (3-5) Selected concepts and methodologies useful for the analysis of politics and social structure in the socialist countries of east-central and southeastern Europe. Prerequisite: permission of instructor. Offered jointly with POL S 537.

SISRE 505 Seminar: Problems of Social and Political Development in Eastern Europe (3-6) Research seminar dealing with selected problems of continuity and change in eastern Europe. Prerequisite: some previous course work on eastern Europe.

SISRE 555 Russian Ocean Policy (3) *Kaczynski* Russian ocean policy following perestroika and disintegration of Soviet empire. Discusses Russian navy, fishery industry, merchant marine, ocean research fleet, in light of international agreements, and joint ventures and new political, economic, and social environments. Prerequisite: knowledge of Soviet/Russian socio-economic problems or permission of instructor. Offered jointly with SMA 555.

SISRE 590 Special Topics (5, max. 10) Course content varies. Offered occasionally by visitors or resident faculty.

SISRE 600 Independent Study or Research (*)

SISRE 700 Master's Thesis (*)

South Asian Studies

SISSA 510 Introduction to Interdisciplinary Study of South Asia (5) *Salomon* Examines work done in the various disciplines focusing on South Asia.

SISSA 511 Seminar on South Asia (5) Interdisciplinary seminar for graduate students in which research and writing on individual research topics are critically developed. Designed to provide each student with an opportunity to synthesize his or her studies on South Asia. Prerequisite: 510 or permission of graduate program coordinator.

SISSA 590 Special Topics (5, max. 10) Seminar. Course content varies. Offered occasionally by visitors or resident faculty.

SISSA 600 Independent Study or Research (*)

SISSA 700 Master's Thesis (*)

Japan Studies

See International Studies

Jewish Studies

See International Studies

Korea Studies

See International Studies

Labor Studies

Minor

The Labor Studies minor brings together a series of courses on labor in core social science departments. It provides students with an interdisciplinary program of study focusing on the importance of labor to the economic, social, political, and cultural evolution of modern societies.

Minor Requirements: 30 credits, including HIST 249/ POL S 249/ SOC 266 (5 credits). Additional 25 credits (no more than 10 from any one department) from the following: HIST 449, HSTAA 450, HSTAA 480, POL S 405, POL S 447, SOC 447, SOC 466, AES 361, CHSTU 354, ECON 443, ECON 444, HRMOB 420. 2.0 minimum grade required in all courses applied toward the minor.

Latin American Studies

See International Studies

Linguistics

A210 Padelford

Linguistics is the scientific study of language, which is one of the most characteristic human attributes. In contrast with other language-related disciplines, linguistics deals with languages from the point of view of their internal structure as cognitive systems. Courses provide training in the method and theory of language analysis and description, as well as studies of language change and language acquisition.

Undergraduate Program

Adviser
A211 Padelford
email: lingadv@u.washington.edu

Bachelor of Arts

Admission Requirements—Romance Linguistics: Two college years (or equivalent) of study in each of two Romance languages.

Major Requirements

General Linguistics: LING 200 or other introductory course in linguistics; 451, 452, 461, 462, 442, 453, 463 or 481; at least one year of each of two languages, one of which must belong to a different family of languages than the student's native language; 20 additional credits of departmentally approved courses in linguistics.

Romance Linguistics:

1) **Comparative**—LING 200 or 400 (4-5 credits); ROLING 402 (5 credits); three courses from LING 451, 452, 461, 462 (12 credits); 15 credits of language structure (from FRENCH and/or SPAN 400 through 409); either FRENCH or SPAN 301, 302 and 303 or equivalent (15 credits); completion of first-year program (103 or beyond) in a second Romance language; an approved 5-credit elective at the 400 level in FRENCH, ITAL, SPAN, LING or ROLING.

2) **Spanish Structure**—LING 200 or 400 (4-5 credits); three courses from LING 451, 452, 461, 462 (12 credits); 15 credits of Spanish structure (from SPAN 400 through 409); SPAN 301, 302 and 303 or equivalent (15 credits); 25 credits of approved electives in additional upper-division course work in SPAN, LING, ROLING.

3) **French Structure**—LING 200 or 400 (4-5 credits); three courses from LING 451, 452, 461, 462 (12 credits); 15 credits of French structure (from FRENCH 400 through 409); FRENCH 301, 302 and 303 or equivalent (15 credits); 25 credits of approved electives in additional upper-division course work in FRENCH, LING, ROLING.

Minor

Minor Requirements: 28 credits to include LING 400 or other introductory course in linguistics; three courses from LING 442, 451, 452, 461, 462, or 481; 12 additional

tional credits from a list of departmentally approved courses in linguistics.

Graduate Program

Heles Contreras, Graduate Program Coordinator
A210F Padelford

The Department of Linguistics offers programs of studies for graduate students leading to the degrees of Master of Arts and Doctor of Philosophy. The program is administered by the departmental faculty.

The major interest of the core faculty lies in theoretical linguistics: syntax, semantics, phonology, and Romance linguistics. Courses are also offered within the department in historical linguistics, field methods, and theory of second language learning.

Some course work is also available in various cooperating departments. Among those fields represented outside the department are anthropological linguistics; applied linguistics; speech and phonetics; philosophy of language; and the structure and history of a number of individual languages and language families.

Admission Requirements: At least one previous course in linguistics is highly recommended, as is proficiency in one language other than the student's native language. Three letters of recommendation and Graduate Record Examination scores are required for all applicants. Doctoral degree applicants should send the department a copy of their master's thesis or a paper of high quality, or both.

Master of Arts

Two courses each in syntax and phonology, one each in semantics and historical linguistics. Three more courses at the 400 or 500 level in other areas. At least three of the nine courses must be at the 500 level. Demonstrated ability to read the linguistic literature in some language other than English. An M.A. exam in areas in which the GPA is below 3.30. A short M.A. thesis.

Doctor of Philosophy

Direct admission to the Ph.D. program will be considered on an individual basis for applicants holding a degree from a comparable M.A. thesis program in linguistics or a closely related field. Some applicants may be granted admission directly into the Ph.D. program, with the stipulation that they make up one or more M.A.-level deficiencies.

Requirements for the Ph.D. degree are: 27 credits of course work beyond the M.A., at least 18 credits of which must be at the 500 level and be completed before the General Examination. A year's study of an "exotic" language. Two linguistics papers delivered at a colloquium or conference. A General Examination, involving the writing of two papers in different areas of linguistics and an oral examination, in which the candidate is questioned on the papers. A dissertation suitable for publication and a Final Examination, in which the candidate defends the dissertation.

Faculty

Chair

Frederick J. Newmeyer

Professors

Brame, Michael K. * 1974; PhD, 1970, Massachusetts Institute of Technology; syntax, phonology, structure of Arabic and English.

Coachman, Marina * 1984, (Research); PhD, 1976, Moscow Institute of Foreign Languages; theory of translation, theory of versification, second language acquisition, semantics.

Contreras, Heles * 1964; PhD, 1961, Indiana University; Spanish linguistics, syntax and semantics.

Dale, Philip S. * 1968, (Adjunct); PhD, 1968, University of Michigan; psycholinguistics, language and cognitive development in normal and exceptional children.

Kaisse, Ellen * 1976; PhD, 1977, Harvard University; phonology, historical linguistics, ancient and modern Greek/Spanish, syntax-phonology interface.

Klausenburger, Jürgen * 1969; PhD, 1969, University of Michigan; Romance linguistics.

Micklesen, Lew R. * 1966, (Emeritus); PhD, 1951, Harvard University; Slavic linguistics.

Newmeyer, Frederick J. * 1969; PhD, 1969, University of Illinois; theoretical and English syntax, language and society, history of linguistics.

Shapiro, Michael * 1970, (Adjunct); PhD, 1973, University of Chicago; Indo-Aryan languages and linguistics.

Silberstein, Sandra V. * 1982, (Adjunct); PhD, 1982, University of Michigan; TESL, critical theory, discourse analysis, sociolinguistics, language and culture.

Tollefson, James W. * 1984, (Adjunct); PhD, 1978, Stanford University; English as a second language, language planning.

Voyles, Joseph B. * 1965, (Adjunct); PhD, 1965, Indiana University; Germanics and linguistics.

Associate Professors

Coats, Herbert S. * 1968, (Adjunct); PhD, 1970, University of Illinois; Slavic linguistics, Russian phonology, Russian syntax, Slavic accentuation.

Hargus, Sharon Louise * 1985; PhD, 1985, University of California (Los Angeles); phonology, morphology, northwestern Native American languages, lexicography, phonetics.

Strozer, Judith R. * 1987; PhD, 1976, University of California (Los Angeles); comparative Romance syntax, second language acquisition, foreign language teaching.

Zagona, Karen T. * 1987; PhD, 1982, University of Washington; syntactic theory and Spanish syntax.

Assistant Professors

Herschensohn, Julia R. * 1985; PhD, 1976, University of Washington; romance linguistics, French syntax, second language acquisition.

Kim, Soowon 1992; PhD, 1991, Brandeis University; syntactic theory and syntax-semantics interface, structure of Korean and Japanese.

Ogihara, Toshiyuki * 1991; PhD, 1989, University of Texas (Austin); semantic theory, mathematical linguistics, structure of Japanese.

Riggenbach, Heidi R. * 1989, (Adjunct); PhD, 1989, University of California (Los Angeles); teaching English as a second language, discourse analysis, sociolinguistics.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

Linguistics

Credit is allowed for only one of the following: LING 200, 201, 203. Ordinarily students who have taken one of these courses should not then take LING 400, although credit for both is allowed.

LING 100 Fundamentals of Grammar (5) VLPA Introduction to basic grammatical concepts and terminology. Specifically intended for students planning to take a foreign language or linguistics.

LING 200 Introduction to Linguistic Thought (5) VLPA/ISS, QSR Language as the fundamental characteristic of the human species; diversity and complexity of human languages; phonological and grammatical analysis; dimensions of language use; language and writing; impact of historical linguistics on contemporary theory.

LING 201 Introduction to Linguistic Theory and Analysis (5) VLPA/ISS, QSR Background and scope of modern linguistics; behaviorist versus rationalist theories of language; universal and cognitive aspects of language structure; interplay of genetic and social factors in language formation; linguistic analysis.

LING 203 Introduction to Anthropological Linguistics (5) VLPA/ISS Hargus, Hunn, Palmer Linguistic methods, theories used within anthropology. Descriptive and theoretical linguistics compared; historical linguistics, comparative method; sociolinguistics; language, culture; human language and animal communication compared; survey of history of anthropological linguistics in North America. Offered: jointly with ANTH 203.

LING 242 Introduction to Meaning (5) VLPA Tarinskaja Non-technical introduction to meaning in language and how it functions in communication and thinking. Discussion of how and why meanings of words change through time. Prerequisite: 200 or 201.

LING 300 Introduction to the Languages of the World (5) VLPA Brame A survey of the world's languages, focusing on their syntactic, phonological, and morphological properties. Prerequisites: 200, 201, or 203.

LING 333 Linguistics and Society (3) VLPA/ISS Interaction of language, culture, and society, and the relationship of linguistic theory to societal problems. Ethical and political considerations involved in the application of linguistic theory.

LING 347 Psychology of Language I (5) VLPA/ISS Dale, Corina, Osterhout Introduction to the study of language, including language structure, speech perception, language acquisition, psychological processes underlying comprehension and production of language, the relation between brain and language, and the question of the species-specificity of human language. Prerequisites: 200 or 201 or PSYCH 101 or 102. Offered: jointly with PSYCH 347.

LING 372 Language and Translation (5) VLPA Tarinskaja Role of linguistic concepts in the process of translation from one language to another. Attention to both language universals and language particulars. Prerequisite: 200 or 201.

LING 400 Survey of Linguistic Method and Theory (4) VLPA, QSR Major linguistic theories in phonology, syntax and semantics; linguistic analysis and argumentation. Intended for students who plan to pursue further linguistic or language-related study.

LING 401 The Linguistic, Philosophical, and Political Thought of Noam Chomsky (3) VLPA/ISS Relation of current work in Chomskyan linguistics to philosophical, psychological, political, and educational thought.

LING 402 Survey of the History of Linguistics (3) VLPA/ISS Newmeyer Main trends in linguistic theory and philosophy of linguistics from ancient times through advent of transformational-generative grammar. Includes nineteenth-century comparative and historical grammar, Prague school grammar, American structuralist grammar, major concerns of linguistics today. Prerequisite: 451 or permission of instructor.

LING 404, 405, 406 Indo-European (3, 3, 3) VLPA Voyles Overview of the Indo-European languages, of comparative method, and of the phonology, morphology, and syntax of reconstructed Indo-European. Grammatical analyses and texts from various attested

ancient and modern Indo-European languages, selected according to the interests of the students.

LING 411 Native Languages and Language Families of Washington State (3) VLPA *Hargus* Survey of linguistic structures of Washington native languages. Language families consist of Salish, Wakashan, Chemakuan, Athabaskan, Chinookan, Sahaptian, Cayuse. Structure and origin of Chinook jargon. Prerequisites: 451 and 461 or 481.

LING 419 The Development of the Italian Language (5) VLPA Historical survey of Italian phonology, morphology, and syntax. Evolution of the language is illustrated with study of pertinent documents from various periods. Prerequisites: 301, 302, 303, LING 400, or ROLING 401 or permission of instructor. Offered: jointly with ITAL 400.

LING 432 Sociolinguistics (3) VLPA/I&S Social variation in the phonology, morphology, syntax, lexicon of languages and dialects. Nonstandard language, diglossia, pidgins and creoles, gender differences, bi- and multilingualism, ethnography of speaking, pragmatics, and language attitudes. Prerequisite: 400. Recommended: prior or concurrent registration in 451 or permission of instructor. Offered: jointly with ANTH 432.

LING 433 Language Policy and Cultural Identity (3) VLPA/I&S Decision making regarding language in sociopolitical contexts. Language and ethnicity, educational policy, use of language in developing nations. Plans to modernize, purify, standardize, reform, and revive language. Language loyalty and motives for second-language acquisition. Prerequisite: 200 or 400. Offered: jointly with ANTH 464.

LING 442 Introduction to Semantics (4) VLPA/NW *Ogihara* Semantic analysis and theory of meaning and interpretation of language. Relation of semantics to syntax and phonology, psycholinguistics, and language acquisition. Comparison of various linguistic theories of meaning. Prerequisite: 200 or 400.

LING 443 Philosophy and Linguistics (3) VLPA/I&S Philosophical problems that arise in the attempt to understand current linguistic theories and the implications of linguistics for philosophy. Offered: jointly with PHIL 443.

LING 444 Philosophy of Language—Pragmatics (3) VLPA/I&S *Potter* Language as communicative activity. Speech act theory in Austin, Grice, and contemporary writings. Applications to problems of reference, presupposition, metaphor, relativism. Offered: jointly with PHIL 444.

LING 445 Descriptive Aspects of English as a Foreign Language (3) VLPA Linguistic analysis as a basis for the teaching of English as a foreign language; language as rule-governed behavior. Prerequisite: 200 or 400 or permission of instructor.

LING 446 Descriptive Aspects of English: Phonology and Morphology (3) VLPA *Hargus, Kaisse* Descriptively oriented analysis of English phonology and morphology; dialect differences. Prerequisites: 451.

LING 447 Psychology of Language II (5) VLPA/I&S *Corina, Dale, Osterhout* Psychological principles applied to linguistic development and organization; language in both its stimulus and response aspects. Prerequisite: PSYCH 101 or 102 or equivalent. Offered: jointly with PSYCH 447.

LING 449 Second-Language Learning (3) VLPA *Tarlinckaja* Issues related to the psychological aspects of second-language learning. Prerequisite: 200 or 400 or permission of instructor.

LING 450 Introduction to Linguistic Phonetics (3) VLPA/NW Introduction to the articulatory and acoustic correlates of phonological features. Issues covered include the mapping of dynamic events to static repre-

sentations, phonetic evidence for phonological description, universal constraints on phonological structure, and implications of psychological speech-sound categorization for phonological theory. Prerequisites: 200, 201, or 400.

LING 451, 452, 453 Phonology I, II, III (4, 4, 4) VLPA/I&S *Hargus, Kaisse* Speech sounds, mechanism of their production, and structuring of sounds in languages; generative view of phonology; autosegmental and metrical phonology. Prerequisite: 200 or 400, either of which may be taken concurrently with 451. Offered: jointly with ANTH 451, 452, 453.

LING 454 Methods in Comparative Linguistics (3) VLPA *Klausenburger, Shapiro, Voyles* Method and theory of historical and comparative linguistics. Problems of phonological, morphological, syntactic, and semantic change and reconstruction. Prerequisite: 400 or permission of instructor, undergraduate adviser, or graduate program coordinator.

LING 455 Areal Linguistics (3, max. 6) VLPA/I&S Issues involved in classification of languages. Systems of classification based on structure, word order, areal features. Ways in which languages may be classified for different purposes. Processes such as borrowing, vocabulary specialization, lexical change, and language death and revival. Offered: jointly with ANTH 455.

LING 457 Language Development (5) VLPA/I&S *Dale* First-language acquisition and use by children. Emphasis on theoretical issues and research techniques. Prerequisite: 400 or PSYCH 306 and junior or senior standing. Offered: jointly with PSYCH 457.

LING 461, 462, 463 Syntax I, II, III (4, 4, 4) VLPA/I&S *Brame, Contreras, Kim, Newmeyer* Study of the structural properties of language; introduction to generative transformational syntax. Prerequisite: 200 or 400 or permission of instructor. Offered: jointly with ANTH 461, 462, 463.

LING 471 Survey of Linguistic Theories (5) VLPA *Brame* A comparative study of alternative models of grammatical description.

LING 472 Introduction to Computational Linguistics (3) VLPA *Hoard* Introduction to computer applications of linguistic theory, including syntactic processing, semantic and pragmatic interpretation, and natural language generation. Prerequisite: 461 or permission of instructor. Offered: jointly with CSE 472.

LING 476 Philosophy of Language (5) VLPA/I&S Current theories of meaning, reference, predication, and related concepts. Recommended: PHIL 120. Offered: jointly with PHIL 453.

LING 479 Formal Semantics and Natural Language (3) VLPA/I&S *Ogihara* Formal characterization of linguistic meaning. Emphasis on nature and purpose of formal semantics and on its relation to formal syntax. Typical topics: Tarskian definitions of truth; "truth theory" and theory of meaning; possible world semantics; Montague semantics; generative semantics; Chomsky on syntax and semantics. Recommended: PHIL 120 or 470. Offered: jointly with PHIL 479.

LING 480 Topics in Linguistics (3, max. 12) VLPA Introduction to an area of linguistic study not covered by the regular departmental course offerings.

LING 481 Introduction to Morphology (4) VLPA *Brame, Hargus, Kaisse, Newmeyer* Structure of words and the processes by which they are formed. Morphological processes in a wide variety of languages. Prerequisites: 451 and 461.

LING 499 Undergraduate Research (1-5) Credit/ no credit only.

Romance Linguistics

ROLING 401 Comparative Romance Linguistics (5) VLPA *Klausenburger, Zagana* Descriptive analysis of the phonological, morphological, and syntactical structures of the modern Romance languages. Prerequisite: the equivalent of two college years of a Romance language or permission of instructor.

ROLING 402 Historical Romance Linguistics (5) VLPA *Klausenburger, Zagana* Comparative historical survey of the development of the principal Romance tongues. Prerequisite: 401 or permission of instructor.

ROLING 490 Senior Essay (2) Essay on linguistic problem of student's choice written with faculty consultant.

French Linguistics

FRLING 400 The Syntactic Structure of French (5) VLPA Scientific study of the syntax of French: phrase structures and transformations (emphasis on passives, relativization, pronominalization, reflexive structures). Prerequisites: FRENCH 323 or ROLING 401 or permission of instructor. Offered: jointly with FRENCH 400.

FRLING 401 The Morphological Structure of French (5) VLPA Linguistic study of French morphology. Prerequisite: FRENCH 323 or ROLING 401 or permission of instructor. Offered: jointly with FRENCH 401.

FRLING 402 The Phonological Structure of French (5) VLPA The phonological component of the generative grammar of French: representations of syllabic and segmental units, phonological rules, distinctive features and their articulatory correlates. Prerequisites: FRENCH 323 or ROLING 401 or permission of instructor. Offered: jointly with FRENCH 402.

FRLING 403 Background of Modern French (5) VLPA *Klausenburger* Linguistic analysis of the important developments in the history of the French language from its Latin origin to contemporary speech. Prerequisite: FRENCH 323 or ROLING 401 or permission of instructor. Offered: jointly with FRENCH 403.

FRLING 405 Linguistics and the Teaching of French (5) VLPA Areas of linguistics that can be particularly helpful to the French teacher. Prerequisites: FRENCH 323 or ROLING 401 or permission of instructor. Offered: jointly with FRENCH 405.

FRLING 406 Advanced French Grammar (5) VLPA Problems of French grammar. Differences between forms and structures of French and English. Problems of effective teaching of French. For students with at least three years of college French and for beginning teaching assistants. Prerequisites: FRENCH 303 or permission of instructor. Offered: jointly with FRENCH 406.

FRLING 409 The Phonetics of French (5) VLPA Scientific study of the French sound system with special emphasis on "lower level" phonetic rules, with integral values. Focus on data from standard French as well as socioeconomic and geographic variations. Prerequisites: FRENCH 323 or ROLING 401 or LING 200 or 400 and two years of college-level French. Offered: jointly with FRENCH 409.

Spanish Linguistics

SPLING 400 The Syntactic Structure of Spanish (5) VLPA *Strozer, Zagana* Scientific study of the syntax of Spanish: structure of phrases, transformationally derived structures, grammatical relations, principles of interpretation. Prerequisites: SPAN 302 and 323. Offered: jointly with SPAN 400.

SPLING 401 The Morphological Structure of Spanish (5) VLPA *Strozer, Zagana* Principles of word formation, including derivational and inflectional morphology. Relationship between inflectional morphology and other components of grammar. Prerequisite:

sites: SPAN 302 and 323. Offered: jointly with SPAN 401.

SPLING 402 The Phonological Structure of Spanish (5) VLP *Strozer, Zagana* Phonological component of the generative grammar of Spanish; representations of syllabic and segmental units, phonological rules, distinctive features and their articulatory correlates. Prerequisites: SPAN 302 and 323. Offered: jointly with SPAN 402.

SPLING 403 The Evolution of the Spanish Language (5) VLP *Zagana* Historical survey of Spanish phonology, morphology, and syntax, from Latin origins to the modern language. Prerequisites: SPAN 302 and 323. Offered: jointly with SPAN 403.

SPLING 406 Advanced Spanish Grammar (5) VLP *Anderson, Strozer* Problems of Spanish grammar. Difference from English grammar. Techniques for the effective teaching of Spanish. Prerequisites: SPAN 302 and 323. Offered: jointly with SPAN 406.

SPLING 409 Spanish Phonetics (5) VLP *Anderson* Analysis of sounds: training in pronunciation, intonation, and close transcription of Spanish language in its modalities. Prerequisite: SPAN 302 or graduate standing. Offered: jointly with SPAN 409.

Courses for Graduates Only

Linguistics

LING 501, 502, 503 Linguistic Analysis Laboratory (3, 3, 3) Guided analysis of a language unfamiliar to all students of the class; construction of a grammar based on material elicited from native informant. Prerequisites: 453, 462, or permission of instructor.

LING 507 Syntactic Theory I (4) Introduction to the principles and parameters model of syntactic theory. The lexicon and its relation to syntactic representations. Syntactic modules and principles. Problem solving.

LING 508 Syntactic Theory II (4) Historical antecedents of the principles-and-parameters theory. Lexicalism versus transformationalism. The unification of transformational operations and conditions. Origins of subtheories. Extensive reading list of primary sources. Practical training in syntactic argumentation. Prerequisites: 507 or permission of instructor.

LING 509 Syntactic Theory III (4) Current issues in syntactic theory, including logical form, empty categories, the range of parametric variation, barriers, minimality, and the status of functional categories. Training in the methodology of syntactic research. Prerequisites: 508 or permission of instructor.

LING 514 Seminar in Comparative Linguistics (3) *Kaisse* Nineteenth- and twentieth-century theories of phonological change. Prerequisite: 404 or permission of instructor.

LING 519 Mathematical Models of Grammar (3) *Brame, Ogihara* Study of some mathematical models of language recognition, emphasizing context-free and context-sensitive grammars. Prerequisite: graduate standing in mathematics, linguistics, or psychology, or permission of instructor.

LING 522 Topics in the History of Linguistics (3) *Newmeyer* Intensive investigation of the main trends in the history of linguistics, concentrating on the development of nineteenth-century historical linguistics, the various schools of structural linguistics, and transformational-generative grammar. Prerequisites: 451, 461.

LING 524 Seminar in Theoretical Linguistics (4, max. 8) Individual and joint research on selected topics in theoretical linguistics. Topics change each quarter. Typical topics are semantics, generative grammar, phonological theories. Prerequisites: 453, 463.

LING 525 Seminar in Theoretical Phonology (4, max. 12) Individual and joint research on selected topics in theoretical phonology. Topics vary. Typical offerings include phonology and the lexicon, syntax and phonology, phonological representations. Prerequisite: 453.

LING 530 Dialectology (3) The principles of dialect deviation as related to linguistic structure and usage. Prerequisite: 452 or permission of instructor. Offered: jointly with ANTH 530.

LING 531 Problems in Romance Linguistics (2-5, max. 15) *Contreras, Klausenburger, Zagana* Group seminar, or individual conferences are scheduled under this number to meet special needs. Prerequisite: permission of graduate program coordinator. Offered: jointly with ROLING 531.

LING 540 Phonological Development (3) *Stoel-Gammon* Selected topics in the developmental sequence of phonological systems in normal-speaking children. Relationships between possible phonological inventories and rule systems in different languages. Prerequisites: 451, 452, or permission of instructor. Offered: jointly with SPHSC 540.

LING 541 Syntactic and Semantic Development (3) *Dale* Selected topics in the study of child language (e.g., cognitive basis of language, early semantic systems, development in language-handicapped children). Topics vary. Prerequisites: one course in child language development and permission of instructor. Offered: jointly with SPHSC 541.

LING 550, 551, 552 Advanced Phonology (2-3, 2-3, 2-3) *Hargus, Kaisse* Problems in phonological theory, generative phonology, phonological change. Theories of prosody. Prerequisites: 451, 452, 453.

LING 553 Analysis of Linguistic Structures (3, max. 8) Syntactic, semantic, and/or phonological analysis. Languages to be analyzed vary. Prerequisite: permission of instructor. Offered: jointly with ANTH 553.

LING 561, 562, 563 Advanced Syntax (2-3, max. 9, 2-3, max. 9, 2-3, max. 9) Advanced study in modern syntactic theory. Topics change each quarter. Typical topics are history of transformational grammar, anaphora, logical form. Prerequisites: 461, 462, 463.

LING 565 Contrastive Linguistics (3) The attempt to look across linguistic systems for comparable and contrastive classes and subclasses. Problems of subcategorization and universal grammar. Three conceptually distinct models: structural, transfer grammar, generative. Prerequisites: 452, 463.

LING 579 Comparative Altaic Linguistics (3) Comparative phonology and morphology of Mongolian, Turkic, and other Altaic languages. Prerequisite: permission of instructor. Offered: jointly with ALTAI 579.

LING 580 Problems in Linguistics (2-3, max. 12) Advanced study in current theories of syntax, semantics, phonology, or morphology.

LING 589 Linguistics Colloquium (1, max. 6) Seminar attended by faculty and graduate students to discuss research in progress and topics of general interest. Presentation of two seminars is required for doctoral students. Prerequisite: permission of instructor.

LING 600 Independent Study or Research (*)

LING 700 Master's Thesis (*)

LING 800 Doctoral Dissertation (*)

Romance Linguistics

ROLING 505, 506 Advanced Romance Linguistics (5, 5) *Klausenburger, Zagana* Advanced problems in the phonological, morphological, and syntactical analysis of the Romance languages. Descriptive, com-

parative, and historical considerations. Prerequisites: FRENCH 401, 402, or SPAN 400, or FRENCH 541, 542, or SPAN 541, 542.

ROLING 518 Foreign Language Teaching Methodology (2) *Brandt* Current foreign language teaching methods and approaches. Learning and teaching strategies and techniques for the four skills (reading, writing, speaking, listening) including cultural notions. Current and future trends in pedagogy and technology.

ROLING 521, 522 Seminar in Romance Linguistics (5, 5) *Contreras, Klausenburger, Zagana* Specific problems in linguistic analysis of the Romance languages. Prerequisites: 401, 402.

ROLING 531 Problems in Romance Linguistics (2-5, max. 15) *Contreras, Klausenburger, Zagana* Group seminar, or individual conferences are scheduled under this number to meet special needs. Prerequisite: permission of graduate program coordinator. Offered: jointly with LING 531.

ROLING 551 Romance Linguistics: History, Methodology, and Bibliography (5) For new graduate students in the Romance linguistics program. History of Romance linguistics and linguistic science in the nineteenth and twentieth centuries as it relates to Romance studies. Comparative and descriptive methods used in contemporary scholarship. Prerequisite: 401 or LING 200 or equivalent.

ROLING 590 Special Seminar and Conference (1-10, max. 20) Group seminars, or individual conferences, are scheduled under this number to meet special needs. Prerequisite: permission of graduate program coordinator.

ROLING 600 Independent Study or Research (*)

Mathematics

C138 Padelford

Mathematics is the basic language of physical science, with applications in engineering and business as well as the natural and social sciences. The department has a Mathematical Sciences option in its Bachelor of Science degree program for those students who want to prepare for careers in industry, business, or graduate study in applied mathematics or natural science. For students who want to study mathematics as a discipline in its own right, the department continues to offer the Pure Mathematics option of the B.S. degree. The Bachelor of Arts degree is intended for those students who plan to pursue a secondary teaching career or want to obtain a more general background in mathematics, not for those students who wish to pursue graduate studies in either mathematics or the mathematical sciences.

Undergraduate Program

Thomas Duchamp, Director
Brooke Miller, Director of Student Services
Julie Martinson, Adviser
C36 Padelford

In all options, a grade of 2.0 or higher must be obtained in all mathematics courses presented to satisfy the mathematics requirement, and in required related courses. A GPA of 2.00 or higher must be obtained in all mathematics courses taken at the UW. At least 18 credits of graded mathematics courses numbered 301 or higher must be taken in residence at the UW.

Bachelor of Arts

Admission Requirements: MATH 124, 125, 126 (or MATH 134, 135, 136) and at least one 200- or 300-level mathematics course required for the degree. A mini-

minimum grade of 2.0 in each course to be offered as part of the major; a minimum overall GPA of 2.00 for all mathematics courses. Application to the program should be made at the end of the sophomore year.

Major Requirements

Liberal Arts Option: A minimum of 50 approved credits in mathematics, including MATH 124, 125, 126; 307; 205 or 308; 324 and 26 additional credits at the 300 level and above. Minimum 2 credits of computer courses chosen from CSE/ENGR 142, MATH 187, 387, 464, 487.

Teacher Preparation Option: 50 approved credits in mathematics, including MATH 124, 125, 126; 307; 205 or 308; 324; 411, 412; 444, 445; either STAT 341, 342 or MATH 394, 395 or MATH 354, 355; 6-8 credits of mathematics electives at the 200 level or above; minimum 2 credits of computer courses chosen from CSE/ENGR 142, MATH 187, 387, 464, 487.

Bachelor of Science

Admission Requirements: A minimum of 45 credits completed, including MATH 124, 125, 126 (or MATH 134, 135, 136); 307 and one other 300-level mathematics course and PHYS 121/131, 122/132, 123/133. A minimum grade of 2.0 in each course to be offered as part of the major; a minimum overall GPA of 2.00 for all mathematics courses. Application to the program should be made at the end of the sophomore year.

Major Requirements

Mathematical Sciences Option: Option has two components, mathematics and science. **Mathematics Component** (minimum of 54 credits): must include the core (30 credits), a track (12 credits), and electives (12 credits). [1] Core: must include MATH 124, 125, 126 (or 134, 135, 136); 307 (or 351), 308, 309 (or 353); 324, 326 (or 334, 335, 336). [2] Track: any two of the following sequences: MATH 394, 395 Probability; 402, 403 Modern Algebra; 424, 425 Fundamental Concepts of Analysis; 427, 428 Topics in Applied Analysis. [3] Electives: 12 credits of mathematics courses numbered 301 or higher, excluding 351, 353, 398, 411, 412, 420, 444, 445, 498, and including at least one two-quarter sequence separate from the sequences taken for the track and core requirements. **Science Component:** must include [1] PHYS 121/131, 122/132, 123/133 (15 credits); [2] minimum 2 credits of computer courses chosen from CSE/ENGR 142, MATH 187, 387, 464, 487; [3] 15 approved credits (at the 300 level or above) in the student's chosen area of concentration (must be in an area of natural or social science). Areas of concentration may include, but are not limited to, applied mathematics, astronomy, atmospheric sciences, physics, physical chemistry, and statistics. If computer science is the chosen area of concentration, then the following courses must be completed: CSE/ENGR 142 (4), CSE 143 (5), 373 (3), 410 (3), and either 413 (3), or 415 (5). If applied mathematics is the chosen area, then MATH/AMATH 352 (3), AMATH 401 (4), 402 (4), and 403 (4) are required. If the computing requirement is satisfied by taking both CSE/ENGR 142 and CSE 143, then 12, rather than 15 credits (at the 300 level or above) in an area of natural or social science are required. Students contemplating the mathematical sciences option should seek academic advice in C36 Padelford early in the sophomore year or immediately upon transferring to the University. In particular, students who plan to continue with graduate studies will need advice.

Pure Mathematics Option: (1) A minimum of 66 credits in mathematics. Courses must include MATH 124, 125, 126, 307, 308 (or 134, 135, 136); 324, 326, 327, 328, 427 (or 334, 335, 336); 15 credits from 402, 403, 404, 424, 425, 426; 15 credits of mathematics courses numbered 301 or higher, excluding 351, 352, 353, 398, 411, 412, 420, 444, 445, 498. (2) PHYS 121/131, 122/132, 123/133. (3) Minimum 2 credits of computer

courses chosen from CSE/ENGR 142, MATH 187, 387, 464, 487.

Minor

Minor Requirements: 33 credits to include core (21-25 credits): MATH 124, 125, 126, 307, and 308 (21 credits) or MATH 134, 135, 136 (25 credits, including 10 advanced-placement credits); and electives (8-12 credits): mathematics courses numbered 301 or higher, excluding MATH 351, 352, and 353. 9 credits of courses numbered 301 or higher must be taken at the UW. Minimum grade of 2.0 required for each course offered as part of the minor.

Graduate Program

David H. Collingwood, Director
Brooke Miller, Director of Student Services
C36 Padelford

The degrees of Master of Arts, Master of Science, and Doctor of Philosophy are offered. Opportunities are available within the department for study of pure and applied mathematics for each of these degree programs. The Master of Arts degree is appropriate for students who need a broad background in advanced mathematics and who expect to continue working with mathematics of approximately the same level in their careers. The Master of Science degree is appropriate for students who expect to be working with more specialized mathematics of increasing order of complexity in their careers. The Doctor of Philosophy degree is the highest professional degree in mathematics. It is appropriate for students who plan on a career of research and/or teaching of mathematics at the highest levels.

Of the master's degrees, the M.S. non-thesis program has the most demanding course requirements and most closely matches the early stages of the Ph.D. program. The majority of students who enroll in the department begin their studies with the Ph.D. or M.S. non-thesis program in mind. The M.S. programs with options in numerical analysis or optimization provide more focused training in these directions, which can be useful for students seeking employment in certain industries; however, students intending to do research in these areas would normally follow the requirements of the Ph.D. program. Note that the department does not offer a master's degree in mathematics education.

Master of Arts

Admission Requirement: Bachelor of Arts degree with major in mathematics or equivalent background (minimum of 45 quarter credits, or 30 semester credits of mathematics beyond college algebra).

Graduation Requirements: With Thesis—A minimum of nine one-quarter courses numbered 400 or above, at least three of which are numbered 500, plus 9 thesis credits (700). The total must include at least two courses in each of algebra, analysis, and one other field. Thesis is defended in an oral examination.

Without Thesis—A minimum of twelve approved one-quarter courses numbered 400 or above, at least six of which are numbered 500. The six courses at the 500 level should be distributed over no more than three sequences. The total must include at least two courses in each of algebra, analysis, and one other field. Oral examination in area of specialization in a topic agreed upon by the student and the chair of the examining committee.

Master of Science

Admission Requirement: Bachelor of Science degree with major in mathematics, Bachelor of Arts degree with strong major in mathematics or equivalent background. In particular, at least two of these senior level courses are expected: abstract algebra, real analysis, complex analysis.

Graduation Requirements: With Thesis—A minimum of nine approved one-quarter courses numbered 400 or above, at least six of which are numbered 500, plus 9 thesis credits (700). The total must include at least two courses in each of analysis, algebra, and one other field. Thesis, which is defended in an oral examination, should contain original research.

Without Thesis—Total of twelve numerically-graded one-quarter courses from MATH 402, 403, 404; 424, 425, 426; 427, 428, 429; any 500-level mathematics course, AMATH 584, 585, 586; 569. Courses to include at least two quarters from each of three designated first-year graduate courses, and in addition one three-quarter sequence of 500-level mathematics courses in an area of specialization approved by the graduate program coordinator and the chair of the student's examining committee. Oral examination in the area of specialization in a topic agreed upon by the student and the chair of the examining committee, or the General Examination for the Ph.D. degree.

Numerical Analysis/Optimization Option—Total of twelve one-quarter courses, at least six of which are at the 500 level, chosen from 424, 425, 426; 427, 428, 429; 438, 439; 461, 462; 491, 492; any 500-level mathematics course; AMATH 584, 585, 586; 569. Courses to include four from AMATH 584-586 and MATH 594-599 (numerical analysis option) or four from 507, 509 514-518; (optimization option). Oral examination in a special topic agreed upon by the student and the chair of the student's examining committee. There is no language requirement.

Doctor of Philosophy

Admission Requirement: Mathematical training equivalent to a master's degree in mathematics.

Graduation Requirements: Completion of Graduate School requirements to include satisfactory performance in six sequences numbered 500 or above, including three sequences from the department's list of designated first-year courses; passing of three preliminary exams; demonstration of proficiency in two of three languages: French, German, or Russian; General Examination on a special topic; dissertation that is an original piece of work; and Final Examination.

Research Facilities

An excellent library and computing facilities are located in the same building as the department. The mathematics research library has an outstanding collection of over 33,000 monographs and subscribes to nearly all journals of significance to the mathematics community. The departmental computing facilities in Padelford include networked UNIX workstations serving more than 90 X-terminals and X-compatible PC-RTs. There are five 300 dpi Postscript printers, one of which is color. The Primary document preparation software is TeX (AMSTeX, AMSLaTeX, LamsTeX, LaTeX, and LaTeX2e). Mathematics software includes Maple, Mathematica, Matlab, and Splius. HP and DEC color and grayscale UNIX workstations and Macintosh computers are available to students and faculty in two computer laboratories open 24 hours a day, seven days a week. Other computer facilities outside the department include Macintosh, IBM-PC, and NeXT computer laboratories as well as mainframe computers, high resolution printers, and plotters.

Financial Support

Most graduate students in mathematics are supported by fellowships and teaching assistantships. The workload of teaching assistants allows ample time for graduate courses and thesis work.

Correspondence and Information

Graduate Program Coordinator
C36 Padelford, Box 354350
grads@math.washington.edu

Faculty

Chair

Douglas A. Lind

Professors

Arsove, Maynard G. * 1951, (Emeritus); MS, 1948, PhD, 1950, Brown University; potential theory, complex function theory, theory of bases.

Bass, Richard * 1977; PhD, 1977, University of California (Berkeley); probability theory.

Beaumont, Ross A. * 1940, (Emeritus); MS, 1937, University of Michigan; PhD, 1940, University of Illinois; algebra (Abelian groups, ring theory).

Blmbaum, Z. W. * 1939, (Emeritus); PhD, 1929, John Casimir State University (Poland); probability, mathematical statistics (distribution-free statistics, reliability theory).

Blumenthal, Robert M. * 1956; PhD, 1956, Cornell University; probability theory (Markov processes).

Bube, Kenneth P. * 1986; PhD, 1978, Stanford University; numerical analysis, partial differential equations.

Burduz, Krzysztof * 1988; PhD, 1984, University of California (Berkeley); probability theory.

Collingwood, David * 1987; PhD, 1983, University of Utah; representation theory.

Curjel, Caspar R. * 1964; DSc, 1960, Eidgenossche Technische Hochschule, Zurich; algebraic topology.

Curtis, Edward B. * 1970; PhD, 1962, Harvard University; graph theory, networks.

Duchamp, Thomas E. * 1976; PhD, 1976, University of Illinois; differential geometry, computer graphics.

Erickson, Kent B. * 1973; PhD, 1970, University of Wisconsin; probability theory.

Folland, Gerald Budge * 1973; PhD, 1971, Princeton University; harmonic analysis and differential equations.

Gangolli, Ramesh A. * 1962; PhD, 1961, Massachusetts Institute of Technology; probability theory, harmonic analysis on Lie groups.

Goerss, Paul G. * 1989; PhD, 1983, Massachusetts Institute of Technology; algebraic topology.

Goldstein, Allen A. * 1964, (Emeritus); PhD, 1954, Georgetown University; approximation theory, nonlinear programming, control theory, calculus of variations.

Graham, C. Robin * 1984; PhD, 1981, Princeton University; partial differential equations, differential geometry, invariant theory.

Greenberg, Ralph * 1978; PhD, 1970, Princeton University; number theory.

Grunbaum, Branko * 1966; PhD, 1957, Hebrew University (Israel); geometry.

Hewitt, Edwin * 1948, (Emeritus); PhD, 1942, Harvard University; harmonic analysis on groups, measure theory functional analysis.

Irving, Ronald S. * 1980; PhD, 1977, Massachusetts Institute of Technology; representations of Lie algebras and Lie groups, ring theory.

Jans, James P. * 1957, (Emeritus); PhD, 1955, University of Michigan; ring structure and homological algebra.

Klee, Victor * 1953; PhD, 1949, University of Virginia; convex sets, functional analysis, analysis of algorithms, optimization, combinatorics.

Koblitz, Neal I. * 1979; PhD, 1974, Princeton University; number theory and cryptography.

LeVeque, Randall J. * 1985; PhD, 1982, Stanford University; numerical analysis, hyperbolic conservation laws, computational fluid dynamics.

Lind, Douglas A. * 1975; PhD, 1973, Stanford University; ergodic theory.

Marshall, Donald E. * 1976; PhD, 1976, University of California (Los Angeles); complex analysis.

Michael, Ernest A. * 1953, (Emeritus); PhD, 1951, University of Chicago; topology.

Mitchell, Stephen A. * 1985; PhD, 1981, University of Washington; algebraic topology.

Morrow, James Allen * 1969; PhD, 1967, Stanford University; complex singularities, inverse problems.

Namioka, Isaac * 1963; PhD, 1956, University of California (Berkeley); functional analysis.

Nunke, Ronald * 1958, (Emeritus); PhD, 1955, University of Chicago; category theory, Abelian groups.

Osborne, Mason S. * 1975; PhD, 1972, Yale University; representation theory.

Phelps, Robert R. * 1962; PhD, 1958, University of Washington; convexity, functional analysis, geometry of Banach spaces, optimization.

Pyke, Ronald * 1960; PhD, 1956, University of Washington; probability - Brownian and empirical processes.

Ragozin, David * 1969; PhD, 1967, Harvard University; approximation theory, splines, wavelets, numerical analysis, harmonic analysis.

Rockafellar, R. T. * 1966; PhD, 1963, Harvard University; variational analysis and optimization.

Segal, Jack * 1960; PhD, 1960, University of Georgia; topology and shape theory.

Shorack, Galen * 1965, (Adjunct); PhD, 1965, Stanford University; empirical processes, robustness, nonparametric statistics, reliability, large sample theory.

Smith, S. Paul * 1986; PhD, 1981, University of Leeds (UK); algebra.

Stout, Edgar L. * 1969; PhD, 1964, University of Wisconsin; complex analysis.

Sullivan, John B. * 1973; PhD, 1971, Cornell University; representations of classical groups.

Sylvester, John * 1987; PhD, 1980, New York University; partial differential equations.

Tuncel, Selim * 1986; PhD, 1982, University of Warwick (UK); ergodic theory, symbolic dynamics.

Uhlmann, Gunther A. * 1984; PhD, 1976, Massachusetts Institute of Technology; partial differential equations.

Wan, Frederic Y. * 1983, (Affiliate); PhD, 1965, Massachusetts Institute of Technology; solid mechanics and mathematical modeling.

Warner, Garth * 1966; PhD, 1966, University of Michigan; algebraic topology.

Westwater, Michael J. * 1970; PhD, 1967, Cambridge University (UK); mathematical physics.

Associate Professors

Arms, Judith M. * 1980; MA, 1974, PhD, 1977, University of California (Berkeley); geometric analysis of Hamiltonian systems with symmetry.

Burke, James V. * 1985; PhD, 1983, University of Illinois; optimization, nonsmooth analysis.

King, James Richard * 1974; PhD, 1969, University of California (Berkeley); complex manifolds, instructional computing in geometry.

Kingston, J. Maurice * 1940, (Emeritus); PhD, 1939, University of Toronto (Canada); math education (secondary).

Lee, John M. * 1986; PhD, 1982, Massachusetts Institute of Technology; differential geometry and partial differential equations.

McGovern, William M. * 1990; PhD, 1987, Massachusetts Institute of Technology; representation theory.

Monk, George Stephen * 1964; PhD, 1966, University of Minnesota; mathematics education.

Moore, Robert T. * 1968; PhD, 1964, Princeton University; operator theory, group representation, mathematical software and experimental mathematics.

Smith, Hart F. * 1991; PhD, 1989, Princeton University; partial differential equations, Fourier analysis.

Tseng, Paul Yun * 1990; PhD, 1986, Massachusetts Institute of Technology; optimization.

Assistant Professors

Devinatz, Ethan S. * 1991; PhD, 1985, Massachusetts Institute of Technology; algebraic topology.

Ozols, Vilnis * 1968; PhD, 1967, University of California (Berkeley); Lie groups, Riemannian geometry.

Rush, Jason A. * 1990; PhD, 1988, University of California (San Diego); packing and covering, coding theory, geometry of numbers.

Solomyak, Boris 1992; PhD, 1986, Leningrad University (USSR); ergodic theory, symbolic dynamics.

Zhang, Jian James 1994; MS, 1985, Fudan University (China); PhD, 1991, Massachusetts Institute of Technology; algebra and algebraic geometry.

Senior Lecturer

Warfield, Virginia 1973; MA, 1965, PhD, 1971, Brown University; probability and the teaching of mathematics.

Lecturer

Plochinski, Kenneth 1991; MA, 1983, University of Michigan.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

MATH 100, 102 Algebra (5, 5) Similar to the first three terms of high school algebra. Assumes no previous experience in algebra. Open only to students [1] in the Educational Opportunity Program or [2] admitted with an entrance deficiency in mathematics. Offered: AW, AWSp.

MATH 101 Intermediate Algebra (0) Intermediate algebra equivalent to third semester of high school algebra. Instruction provided by community colleges on UW campus. Extra fee required. Offered: AWSp.

MATH 103 Introduction to Elementary Functions (5) Continues the study of algebra begun in 100 and 102 with emphasis on functions (polynomial, rational, logarithmic, exponential, and trigonometric). Open only students who have completed 102. Offered: AWSp.

MATH 107 Mathematics: A Practical Art (5) NW, QSR For students not planning to take additional mathematics. The exponential function; how it applies to a wide variety of phenomena. Elementary probability and statistics; their use in a variety of applications. Prerequisites: 1.5 years high school algebra and placement test, or equivalent. Offered: WSp.

MATH 111 Algebra with Applications (5) NW, QSR Use of graphs and algebraic functions as found in business and economics. Algebraic and graphical manipulations to solve problems. Exponential and logarithmic functions; various applications to growth of money. Prerequisites: one and a half years of high

school algebra and placement test, or equivalent. Offered: AWS.

MATH 112 Application of Calculus to Business and Economics (5) NW, QSR Rates of change, tangent, derivative, accumulation, area, integrals in specific contexts, particularly economics. Techniques of differentiation and integration. Application to problem solving. Optimization. Credit does not apply toward a mathematics major. Prerequisite: 111. Offered: AWSpS.

MATH 120 Precalculus (5) NW Polynomial, rational, exponential, and trigonometric functions. For students needing preparation for 124; not advised for students who will not take 124. Does not satisfy natural science distribution or Q/SR proficiency requirement. Prerequisites: two years high school algebra and placement test or equivalent. Offered: AWSpS.

MATH 124 Calculus with Analytic Geometry I (5) NW, QSR Differentiation, applications of derivative, integration. Calculus for natural sciences and engineering students. Prerequisites: four years of college preparatory mathematics or equivalent (normally including precalculus or mathematical analysis with grades of B or better) and placement test or grade of 2.5 in 120, or equivalent. Offered: AWSpS.

MATH 125 Calculus with Analytic Geometry II (5) NW Applications of integration, transcendental functions, methods of integration and improper integrals, introduction to first order ordinary differential equations. Prerequisite: 124. Offered: AWSpS.

MATH 126 Calculus with Analytic Geometry III (5) NW Vectors and vector functions in space, functions of several variables and applications, multiple integrals. Prerequisite: 125. Offered: AWSpS.

MATH 134, 135, 136 Accelerated [Honors] Calculus (5, 5, 5) NW, QSR Covers the material of 124, 125, 126; 307, 308. First year of a two-year accelerated sequence. May receive advanced placement (AP) credit for 124 after taking 134, and for 125 after taking 135. May not receive credit for both 126 and 136. For students with above average preparation, interest, and ability in mathematics. Prerequisites: one year of high school calculus and AP score of 4 or more, or equivalent. Offered: A, W, Sp.

MATH 170, 171 Mathematics for Elementary School Teachers (3, 3) NW Basic concepts of numbers and operations (170) and of geometry (171). Emphasizes problem solving, communication of mathematical ideas, and analysis of sources of difficulty in learning/teaching these concepts. Credit may not apply toward a mathematics major. 170 required for elementary education students. Credit/no credit only. Prerequisites: 3 years of high school math. Offered: AWS, Sp.

MATH 187 Elementary Mathematics Computer Laboratory (1, max. 3) NW Laboratory activities designed to introduce computing as a tool for doing mathematics, to be taken jointly with a designated section of a 100-level mathematics course. Credit/no credit only. Prerequisite: concurrent registration in a designated 100-level mathematics course. Offered: AWSp.

MATH 197 Problem Solving in Mathematics (2, max. 4) NW Lectures and problem sessions in mathematics with applications. Enrollment restricted to EOP students only. Credit/no credit only. Offered: AWSp.

MATH 198 Special Topics in Mathematics (1-5, max. 15) NW Independent reading in math. Does not count as credit toward a math major. Credit/no credit only. Prerequisites: concurrent or previous enrollment in 124; approval of Director of Undergraduate Math Program, and supervision of regular faculty member. Offered: AWSpS.

MATH 205 Elementary Linear Algebra (3) NW Systems of equations, vector spaces, matrices, linear transformations, characteristic vectors. Not open for

credit to students who have taken 308. Prerequisite: 124 or 112. Offered: S.

MATH 301 Elementary Number Theory (3) NW Brief introduction to some of the fundamental ideas of elementary number theory. Prerequisite: 126 or 136. Offered: AWS.

MATH 307 Introduction to Differential Equations (3) NW Taylor series, first and second order ordinary differential equations. Prerequisite: 125. Recommended: 126. Offered: AWSpS.

MATH 308 Linear Algebra with Applications (3) NW Systems of linear equations, vector spaces, matrices, subspaces, orthogonality, least squares, eigenvalues, eigenvectors, applications. For students in engineering, mathematics, and the sciences. Prerequisite: 126. Offered: AWSpS.

MATH 309 Linear Analysis (3) NW First order systems of linear differential equations, Fourier series and partial differential equations, the phase plane and/or Laplace transforms. Prerequisites: 307, 308. Offered: AWSpS.

MATH 324 Advanced Multivariable Calculus I (3) NW Vector and scalar fields, line integrals, surface and volume integrals, theorems of Green, Gauss, and Stokes. Prerequisite: 126. Offered: AWSpS.

MATH 326 Advanced Multivariable Calculus II (3) NW Elementary topology, general theorems on partial differentiation, maxima and minima, differentials, Lagrange multipliers, implicit function theorem, inverse function theorem and transformations, change of variables formula. Prerequisites: 308 and 324. Offered: AWSp.

MATH 327, 328 Introductory Real Analysis I, II (3, 3) NW Limits and continuity of functions, sequences, series tests, absolute convergence, uniform convergence. Power series, improper integrals, uniform continuity, fundamental theorems on continuous functions, theory of the Riemann integral. Prerequisites: 126 and 307 for 327, 327 for 328. Offered: AWS, WSp.

MATH 334, 335, 336 Accelerated [Honors] Advanced Calculus (5, 5, 5) NW Introduction to proofs and rigor, uniform convergence; Fourier series and partial differential equations, vector calculus, complex variables. Covers essentially the same material as 309, 324, 325, 326, 427, but with a higher level of rigor. Second year of an accelerated two-year sequence which prepares students for senior level mathematics courses. Prerequisites: either 136 or 126, 307 and either 308 or 205. Offered: A, W, Sp.

MATH 340 Abstract Linear Algebra (3) NW Linear algebra from a theoretical point of view. Abstract vector spaces and linear transformations, bases and linear independence, matrix representations. Jordan canonical form, linear functionals, dual space, bilinear forms, and inner product spaces. Prerequisite: 308 or 205. Offered: Sp.

MATH 351 Quantitative Methods I (3) NW Applications of mathematical techniques to problems in the sciences and engineering. Emphasis on formulation, solution, and interpretation of results. Introductory survey of differential equations. Prerequisites: 126. Offered: jointly with AMATH/OCEAN 351; A.

MATH 352 Quantitative Methods II (3) NW Development and application of numerical methods and algorithms to problems in the applied sciences and engineering. Applied linear algebra and introduction to numerical methods. Emphasis on use of conceptual problems in engineering, mathematics, and science. Prerequisites: 126 and any programming language. Offered: jointly with AMATH/OCEAN 352; W.

MATH 353 Quantitative Methods III (3) NW Applications of mathematical techniques to problems in the sciences and engineering. Emphasis on formulation, solution, and interpretation of results. Introductory survey of partial differential equations. Examples in physi-

cal and biological sciences and engineering. Prerequisite: 307 or 351. Offered: jointly with AMATH/OCEAN 353; Sp.

MATH 354, 355 Special Topics in Math for Teachers (5, 5) NW Map and graph coloring, spanning trees, dominating sets, cryptography, interpretation of graphs, circular motion, statistics that mislead, other topics. Focus on middle school level, with sixth or seventh grade classroom visits lasting all Tuesday morning in alternate weeks. Discussion of readings on math education reform. Offered: A, W.

MATH 381, 382, 383 Introduction to Mathematical Modeling (3, 3, 3) NW Simple discrete and continuous models of diverse natural and social phenomena with particular reference to the unity of the tools of mathematical analysis useful in their study. 381—discrete methods; 382—a mixture of discrete and continuous methods; 383—continuous methods. Mathematical topics and phenomena. Prerequisites: 126 and 308 for 381; 309 or AMATH 351 for 382; 324 and 382 or AMATH 351 and 352 for 383. Offered: jointly with AMATH 381, 382, 383; A, W, Sp.

MATH 387 Intermediate Mathematics Computer Laboratory (1/2, max. 6) NW Laboratory activities in the use of computing as tool for doing mathematics, to be taken jointly with a designated section of a 300-level mathematics course. Credit/no credit only. Prerequisite: concurrent registration in a designated 300-level math course.

MATH 390 Probability and Statistics in Engineering and Science (4) NW Concepts of probability and statistics. Conditional probability, independence, random variables, distribution functions. Descriptive statistics, transformations, sampling errors, confidence intervals, least squares and maximum likelihood. Exploratory data analysis and interactive computing. Students may not receive credit for both 390 and STAT 481. Prerequisites: 307 or 324, and 205 or 308. Offered: jointly with STAT 390; AWSpS.

MATH 394 Probability I (3) NW Sample spaces; basic axioms of probability; combinatorial probability; conditional probability and independence; binomial, Poisson, and normal distributions. Prerequisite: 126. Offered: jointly with STAT 394; AWS.

MATH 395 Probability II (3) NW Random variables; expectation and variance; laws of large numbers; normal approximation and other limit theorems; multidimensional distributions and transformations. Recommended: 324 or 325. Prerequisite: 394. Offered: jointly with STAT 395; WSpS.

MATH 396 Probability III (3) NW Characteristic functions and generating functions; recurrent events and renewal theory; random walk. Prerequisite: 395 or STAT 511. Offered: jointly with STAT 396; Sp.

MATH 398 Special Topics in Mathematics (1-5, max. 15) Independent reading in math. Does not count as credit toward a math major. Credit/no credit only. Prerequisites: approval of Director of Undergraduate Math Program, and supervision of regular faculty member. Prerequisite: 126. Offered: AWSpS.

MATH 402, 403, 404 Introduction to Modern Algebra (3,3,3) NW Algebraic systems; elementary theory of groups, rings, and fields; polynomials; topics in linear algebra; reductions of forms. Prerequisites: 136 or 327 or 340 for 402; 402 for 403; 403 for 404. Offered: AS, WS, Sp.

MATH 407 Linear Optimization (3) NW Maximization and minimization of linear functions subject to constraints consisting of linear equations and inequalities; linear programming and mathematical modeling. Simplex method, elementary games and duality. Prerequisite: 308. Offered: AWS.

MATH 408 Nonlinear Optimization (3) NW Maximization and minimization of nonlinear functions, constrained and unconstrained; nonlinear programming problems and methods. Lagrange multipliers; Kuhn-

Tucker conditions, convexity. Quadratic programming. Prerequisites: 325 or 336; 407 and CSE 142 or equivalent programming experience. Offered: W.

MATH 409 Discrete Optimization (3) NW Maximization and minimization problems in graphs and networks (shortest paths, minimum spanning trees, maximum flows, minimum cost flows); transportation and trans-shipment problems, NP-completeness. Prerequisite: 407. Offered: Sp.

MATH 411, 412 Introduction to Modern Algebra for Teachers (3, 3) NW Basic concepts of abstract algebra with an emphasis on problem solving, constructing proofs, and communication of mathematical ideas. Designed for teaching majors; not open for credit to students who have taken 402, 403. Prerequisites: 205 or 308 for 411; 411 for 412. Offered: AS, WS.

MATH 414, 415 Number Theory (3, 3) NW Congruences, arithmetic of quadratic fields, binary quadratic forms, Dirichlet's theorem on primes in an arithmetic progression, Chebyshev's theorem on distribution of primes, the partition function, equations over finite fields. Prerequisites: 301 for 414; 414 for 415. Offered: even years; W, Sp.

MATH 420 History of Mathematics (3) NW Survey of the development of mathematics from its earliest beginnings through the first half of the twentieth century. Prerequisite: 402 or 411, which may be taken concurrently. Offered: S.

MATH 424, 425, 426 Fundamental Concepts of Analysis (3,3,3) NW Sets, real numbers, topology of metric spaces, normed linear spaces, multivariable calculus from an advanced viewpoint. Introduction to Lebesgue measure and integration. Prerequisites: 327 and either 328 or 336 or permission of instructor for 424; 326 and 424 for 425; 425 for 426. Offered: A, W, Sp.

MATH 427, 428, 429 Topics in Applied Analysis (3,3,3) NW Elementary functions of a complex variable; Cauchy integral formula. Taylor and Laurent series; conformal mapping. Fourier series; orthogonal functions; boundary value problems; applications. Prerequisites: 327 for 427; 309 and 327 for 428; 427 and 428 for 429. Recommended: 328 for 427. Offered: AWS, WSpS, SpS.

MATH 435, 436 Introduction to Dynamical Systems (3, 3) NW Examples of dynamical systems in mathematics and in natural phenomena. Iterated functions, phase portraits, fixed and periodic points. Hyperbolicity, bifurcations. Chaos. Interval maps; quadratic families. Fractals; iterated function systems. Elements of higher dimensional dynamics. Julia sets, the Mandelbrot set. Prerequisites: 325 and either 309 or 352 and 353.

MATH 438 Introduction to Partial Differential Equations (3) NW Integral curves and surfaces of vector fields, initial value problems for first-order linear and quasi-linear equations, Cauchy-Kovalevsky theorem, general Cauchy problem characteristics, special equations. Prerequisites: 309 and 326. Offered: odd years; A.

MATH 439 Introduction to Partial Differential Equations (3) NW Continuation of 438. Laplace's equation and general elliptic equations, wave equation and general hyperbolic equations, heat equation and general parabolic equations. Initial value problems and Dirichlet problems. Green's functions. Maximum principle. Prerequisite: 438. Offered: odd years; W.

MATH 441, 442 Advanced Geometry (3, 3) NW Selected topics from among projective geometry, differential geometry, advanced analytic geometry, algebraic geometry, algebraic topology, and the geometry of convex bodies. Prerequisites: 308 and 326 for 441; 441 for 442. Offered: even years; A, odd years; W.

MATH 444, 445 Geometry for Teachers (3, 3) NW Concepts of geometry from multiple approaches; dis-

covery, formal and informal reasoning, transformations, coordinates, exploration using computers and models. Topics selected from Euclidean plane and space geometry, spherical geometry, non-Euclidean geometries, fractal geometry. Designed for teaching majors. Prerequisites: 126 or 136; 205 or 308 for 444; 444 for 445.

MATH 461, 462 Combinatorial Theory (3, 3) NW Selected topics from among: block designs and finite geometries, coding theory, generating functions and other enumeration methods, graph theory, matroid theory, combinatorial algorithms, applications of combinatorics. Prerequisites: at least one 300-level course in mathematics, statistics, or computer science for 461; 461 for 462. Offered: odd years; W, Sp.

MATH 464, 465, 466 Numerical Analysis I, II, III (4, 4, 4) NW Basic principles of numerical analysis, classical interpolation and approximation formulas, finite differences and difference equations. Numerical methods in algebra, systems of linear equations, matrix inversion, successive approximations, iterative and relaxation methods. Numerical differentiation and integration. Solution of differential equations and systems of such equations. Prerequisites: 308 and 325 or 336, CSE 142 or equivalent programming experience for 464; 464 for 465; 307 and 465 for 466. Offered: A, W, Sp.

MATH 487 Advanced Mathematics Computer Laboratory (1/2, max. 6) NW Laboratory activities in the use of computing as a tool for doing mathematics, to be taken jointly with a designated section of a 400-level mathematics course. Credit/no credit only. Prerequisite: concurrent registration in a designated 400-level math course.

MATH 491, 492 Introduction to Stochastic Processes (3, 3) NW Random walks, Markov chains, branching processes, Poisson process, point processes, birth and death processes, queueing theory, stationary processes. Prerequisites: 396 for 491; 491 for 492. Offered: jointly with STAT 491, 492; A, W.

MATH 496 Honors Seminar (* max. 9) NW Problem seminar for senior honors students and first-year graduate students. Prerequisite: permission of instructor. Offered: AWSp.

MATH 497 Special Topics in Mathematics for Teachers (2-8) NW Study of selected areas of mathematics. Designed for the improvement of teachers of mathematics. Offered: jointly with EDC&I 478.

MATH 498 Special Topics in Mathematics (1-5, max. 15) Reading and lecture course intended for special needs of advanced students. Prerequisite: permission of instructor. Offered: AWSpS.

Courses for Graduates Only

Every year, additional courses are offered, and some of the courses listed are not offered every year. Inquiries about the currently offered courses should be addressed to the Graduate Program, Department of Mathematics.

MATH 504, 505, 506 Modern Algebra (5, 5, 5) Theory of groups, rings, integral domains, and fields; polynomials; vector spaces, Galois theory, and theory of ideals. Prerequisites: 404 or equivalent for 504; 504 for 505; 505 for 506.

MATH 507, 508 Calculus of Variations I, II (5, 3) Necessary and sufficient conditions for a weak and strong extremum. Legendre transformation, Hamiltonian systems. Constraints and Lagrange multipliers. Space-time problems with examples from elasticity, electromagnetics, and fluid mechanics. Sturm-Liouville problems. Approximate methods. Prerequisites: 307 or AMATH 351, MATH 324, 325 for 507; 507 for 508. Recommended 428, 429 or AMATH 402, 403. Offered: jointly with AMATH 507, 508.

MATH 509 Theory of Optimal Control (3) Trajectories from ordinary differential equations with control variables. Controllability, optimality, maximum principle. Relaxation and existence of solutions. Techniques of nonsmooth analysis. Prerequisites: real analysis on the level of 426; background in optimization corresponding to 515. Offered: jointly with AMATH 509; even years.

MATH 510 Seminar in Algebra (2-5, max. 5) Credit/no credit only. Prerequisite: permission of graduate program coordinator.

MATH 511, 512, 513 Special Topics in Algebra (2-3, max. 15; 2-3, max. 15; 2-3, max. 15) In recent years the following subjects have been covered: Abelian groups, algebraic function fields, algebraic number theory, classical groups, game theory, group extensions, lattice theory, Lie algebras, number theory, and structure of rings.

MATH 514 Networks and Combinatorial Optimization (3) Networks and directed graphs. Paths and trees. Feasible and optimal flows and potentials. Transportation problems, matching and assignment problems. Algorithms and applications. Prerequisites: 308 and 324, or equivalent. Offered: jointly with AMATH 514.

MATH 515 Fundamentals of Optimization (5) Maximization and minimization of functions of finitely many variables subject to constraints. Basic problem types and examples of applications; linear, convex, smooth, and nonsmooth programming. Optimality conditions. Saddlepoints and dual problems. Penalties, decomposition. Overview of computational approaches. Prerequisites: MATH 309, 328, or equivalents. Offered: jointly with AMATH 515/IND E 515.

MATH 516 Numerical Optimization (3) Methods of solving optimization problems in finitely many variables, with or without constraints. Steepest descent, quasi-Newton methods. Quadratic programming and complementarity. Exact penalty methods, multiplier methods. Sequential quadratic programming. Cutting planes and nonsmooth optimization. Prerequisite: 515. Offered: jointly with AMATH 516.

MATH 517 Optimization Under Uncertainty (3) Sequential optimization problems involving random variables. Dynamic programming, stochastic programming. Control of uncertain dynamic systems in finite, discrete time. Risk, feedback, adaptivity. Problems with imperfect state information. Applications such as to optimal stopping, inventory control, resource management. Prerequisites: 308, 324 and an introduction to basic concepts of probability, such as 390 or 394, 395. Offered: jointly with AMATH 517.

MATH 518 Topics in Applied Optimization (3) Problems and techniques in special areas of optimization, such as engineering design, resource management, stochastic programming, games, variational inequalities and parameter identification in mathematical modeling. Prerequisite: 515 or permission of instructor. Offered: jointly with AMATH 518; odd years.

MATH 519 Tensor Analysis (3) Cartesian tensors; motivation, manipulation, applications. Riemannian space; Christoffel symbols, geodesics, covariant differentiation. Curvature tensor, geodesic deviations, flat space. Special local coordinate systems. Applications to classical mechanics, continuum mechanics, electromagnetism, relativity. Special topics. Prerequisite: 324 or AMATH 401, or permission of instructor. Offered: jointly with AMATH 519.

MATH 521, 522, 523 Advanced Probability (3, 3, 3) Measure theory and integration, independence, laws of large numbers, Fourier analysis of distributions, central limit problem and infinitely divisible laws, conditional expectations, martingales. Prerequisite: 426. Offered: jointly with STAT 521, 522, 523.

MATH 524, 525, 526 Real Variable (5, 5, 5) Metric spaces; general measures and integration; differentia-

tion of set functions; real valued functions on the line; Banach spaces. Prerequisites: 426 or equivalent for 524; 524 for 525; 525 for 526.

MATH 527, 528, 529 Functional Analysis (3, 3, 3) Review of Banach, Hilbert, and L_p spaces. Locally convex spaces (duality and separation theory, distributions, and function spaces). Operators on locally convex spaces (adjoints, closed graph/open mapping and Banach-Steinhaus theorems). Banach algebras (spectral theory, elementary applications). Spectral theorem for Hilbert space operators. Additional topics chosen by instructor. A working knowledge of real variables, general topology, and complex variables is assumed.

MATH 530 Seminar in Analysis (2-5, max. 5) Prerequisite: permission of graduate program coordinator. Credit/no credit only.

MATH 531, 532, 533 Special Topics in Analysis (2-3, max. 15, 2-3, max. 15, 2-3, max. 15) In recent years the following subjects have been covered: functional analysis, abstract harmonic analysis, linear operators in Hilbert space, group representations, Fourier series and integrals, topological linear spaces, potential theory, and numerical analysis.

MATH 534, 535, 536 Complex Variables (5, 5, 5) Complex numbers, analytic functions, contour integration, power series, analytic continuation, sequences of analytic functions, conformal mapping of simply connected regions. Prerequisites: 426 for 534; 534 for 535; 535 for 536.

MATH 537, 538, 539 Several Complex Variables (3, 3, 3) Weierstrass preparation theorem and its immediate consequences. Analytic continuation, domains of holomorphy, pseudoconvexity, Cartan-Oka theory of coherence, embedding theorems; CR-equations. Connections with algebraic geometry. Prerequisites: 534, 535.

MATH 541, 542, 543 Special Topics in Applied Mathematics (2-3, max. 15, 2-3, max. 15, 2-3, max. 15) Such topics as mathematical quantum theory, fluid mechanics, optimization and operations research, and control theory.

MATH 544, 545, 546 Topology and Geometry of Manifolds (5, 5, 5) Introduction to manifolds: point-set topology, the fundamental group, covering spaces, topological and differentiable manifolds, differential forms, Stokes' theorem, deRham cohomology, vector fields, flows, the Frobenius theorem, Lie groups, homogeneous spaces. Prerequisite: 426.

MATH 547, 548, 549 Geometric Structures (3, max. 9, 3, max. 9, 3, max. 9) Introduction to differential-geometric structures on manifolds. 547: Riemannian metrics, geodesics, covariant differentiation, curvature, Jacobi fields, Gauss-Bonnet theorem. 548, 549: Selected topics, such as connections in vector bundles and principal bundles, symplectic geometry, Riemannian comparison theorems, symmetric spaces, symplectic geometry, complex manifolds, Hodge theory. Prerequisite: 546.

MATH 550 Seminar in Geometry (2-5, max. 5) Credit/no credit only. Prerequisite: permission of graduate program coordinator.

MATH 551, 552, 553 Special Topics in Geometry (2-3, max. 15, 2-3, max. 15, 2-3, max. 15) In recent years, the following subjects have been covered: Riemannian geometry, differentiable manifolds, complex manifolds, geometry of convex bodies.

MATH 554-555-556 Linear Analysis (5-5-5) Advanced linear algebra and matrix analysis, ordinary differential equations (existence and uniqueness theory, linear systems, numerical approximations), Fourier analysis, introductions to functional analysis and partial differential equations, distribution theory. Prerequisites: 426 and familiarity with complex analysis at the level of 427 (the latter may be obtained concurrently.)

MATH 557, 558, 559 Introduction to Partial Differential Equations (3, 3, 3) Theory of distributions and the Fourier transform. Detailed study of main linear equations: wave equation, Laplace's equation, and the heat equation. Sobolev spaces and regularity of solutions of elliptic equations. Theory of pseudodifferential operators. Initial value problem for hyperbolic equations and methods of geometrical optics. Fourier integral operators. The Dirichlet problem and eigenfunction expansions for elliptic equations. Prerequisites: 424, 425, 426, or equivalent, including notion of Lebesgue integral.

MATH 564, 565, 566 Algebraic Topology (3, 3, 3) Classical and modern approaches; complexes and their homology theory; applications. Fixed points, primary obstruction; products and Poincaré duality; axiomatic approach, covering spaces. Prerequisites: 506 for 564; 564 for 565; 565 for 566.

MATH 569 Partial Differential Equations (3) Analytical solution techniques for linear partial differential equations, discussion of how these arise in engineering and science. Transform and Green's function methods. Classification of second-order equations, theory and applications of method of characteristics. Prerequisites: A A 403, A A 568 or 428 or permission of instructor. Offered: jointly with A A 569/AMATH 569.

MATH 570 Seminar in Topology (2-5, max. 5) Prerequisite: permission of graduate program coordinator. Credit/no credit only.

MATH 571, 572, 573 Special Topics in Topology (2-3, max. 15, 2-3, max. 15, 2-3, max. 15) Special topics from general and algebraic topology.

MATH 577, 578, 579 Lie Groups and Lie Algebras (3, max. 9, 3, max. 9, 3, max. 9) Topics chosen from: root systems and reflection groups; the structure, classification, and representation theory of complex semisimple Lie algebras, compact Lie groups, or semisimple Lie groups; algebraic groups; enveloping algebras; infinite-dimensional representation theory of Lie groups and Lie algebras; harmonic analysis on Lie groups. Prerequisites: 506; 526 or 548.

MATH 587 Asymptotics and Special Functions (3) Origin and properties of higher transcendental functions; theoretical basis and applications of Laplace, Fourier, Bessel, Mellin transforms; asymptotic analysis, including methods of steepest descent and stationary phase, WKB. Prerequisite: AMATH 567, 568, 569, or equivalent. Offered: jointly with AMATH 587.

MATH 590 Seminar in Probability (2-6, max. 5) Credit/no credit only. Prerequisite: permission of instructor.

MATH 591, 592, 593 Special Topics in Probability (2-3, max. 15, 2-3, max. 15, 2-3, max. 15) In recent years, the following subjects have been covered: advanced probability theory, stochastic processes, distribution-free inference, game and decision theory, advanced theory of estimation (including sequential estimation).

MATH 594, 595, 596 Special Topics in Numerical Analysis (2-3, max. 15, 2-3, max. 15, 2-3, max. 15) Such topics as linear systems, approximation theory, or the numerical solution of differential equations are covered. Offered: jointly with AMATH 594, 595, 596.

MATH 597 Seminar on Teaching Math (1, max. 3) Issues in the teaching and learning of college mathematics, such as discovering and working with student background and expectations, increasing student engagement with course material, and evaluating student achievement. For graduate students who are, or soon will be, teaching mathematics courses on their own. Credit/no credit only.

MATH 598 Seminar on Technology (1, max. 3) Explores the use of computer technology in teaching and research in mathematics. Develops the basic skills required for using computer mathematics software.

MATH 600 Independent Study or Research (*)

MATH 700 Master's Thesis (*)

MATH 800 Doctoral Dissertation (*)

Microbiology

G315 Health Sciences

Microbiology is a natural science that deals with cellular and acellular forms of life, including bacteria, fungi, protozoa, algae, and viruses. It is concerned with the nature and properties of these entities, their effects on humans and the environment, and how they can be exploited to provide useful products.

Undergraduate Program

Adviser
Sarah Mears
G315 Health Sciences

Bachelor of Science

Admission Requirements: Minimum 75 credits applicable to graduation, with an overall GPA of 2.25 in prerequisite chemistry and biology courses. Students should complete departmental requirements in biology and chemistry (inorganic and organic) before applying for admission.

Major Requirements: Minimum 90 credits in the biological, physical, and mathematical sciences, to include: BIOL 201, 202, 203 or equivalent (15 credits/one year); MICROM 402, 410, 411, 412, 431, 441, 442, 443, 496, and 445 or 450, and approved microbiology electives (36 credits, not to include MICROM 301, 302, 319, 331); CHEM 140, 150, 160 (12 credits) (CHEM 141 recommended) (or CHEM 145, 155); CHEM 223, 224 (8 credits) (or 237, 238, 239; or 335, 336, 337); PHYS 114, 115 (8 credits) (or 121/131, 122/132) (PHYS 116 or 123/133 recommended); either MATH 112 or 124 or Q SCI 381 or STAT 311 (5 credits); BIOC 405, 406 (6 credits) (or 440, 441, 442). In all required and elective microbiology courses used toward graduation, a minimum 2.25 cumulative GPA and a minimum grade of 1.8 in each course. Transfer students must complete at least 20 of the required and elective microbiology credits at the UW.

Minor

Minor Requirements: 30 credits to include 15 credits in biology and chemistry (BIOL 201 or 101-102 or equivalent; CHEM 237 or 220, 221 or equivalent) and 15 credits in 400-level, graded microbiology courses, including at least one lab course (MICROM 402 or 431 or 443; 302 also acceptable), and both MICROM 410 and 496. Minimum 2.00 GPA for all courses.

For faculty listing and course descriptions, see School of Medicine section.

Middle Eastern Studies

See International Studies.

Music

102 Music

The School of Music prepares students for careers as composers, performers, teachers, or researchers. It also offers general courses to nonmajors, designed to enhance the student's understanding of the art of music.

Undergraduate programs include: four-year programs leading to either the Bachelor of Arts or Bachelor of Music and five-year programs leading to the concurrent Bachelor of Arts and Bachelor of Music double degrees. A minor in music is also offered.

An undergraduate music-related degree program in ethnomusicology is offered through General Studies. See music or general studies adviser for details.

Graduate programs lead to the degrees of Master of Arts, Master of Music, Doctor of Musical Arts, and Doctor of Philosophy.

Undergraduate Program

Adviser
Box 353450
email: musicadv@u.washington.edu

Minor

Minor Requirements: A minimum of 25 credits of music courses, i.e., courses with the following prefixes: MUSIC, MUHST, MUSEN, MUSAP, MUSED. No more than 10 credits of 100-level courses may count toward the minor.

Major

Admission Requirements

All students must audition and qualify at the 300 level or better in their principal performance areas in order to be admitted as music majors and to receive private instruction. Major status in performance areas is accorded when, after admission to the College of Arts and Sciences is acknowledged and the required School of Music audition is successfully completed, the student commences applied music study in a performance medium (e.g., voice) with an approved faculty member of the School of Music. Subsequent juries are required for additional qualification for specific performance program emphases and for the Bachelor of Music performance programs. In Music History, Music Education, and Composition, additional entrance requirements apply, and the faculty members of the particular divisions determine the status of individuals accepted.

Continuation of Major Status

Performance studies should begin after audition and acceptance, and continue each subsequent quarter of registration until the minimum program requirements for applied music lessons have been met. Applied music study should continue as long as the student is registered and in residence until the final approved recital is given. In order to retain major standing, the student must make and demonstrate consistent and acceptable progress at the annual required jury. Concurrent enrollment or participation in at least one School of Music ensemble is required during each quarter in which a student receives "MUSAP" applied music instruction. Also, basic piano proficiency is required for all majors. Non-keyboard majors must enroll in the MUSAP 133-235 series until appropriate proficiency is attained.

Any departure from the above requirements must have the recommendation of the appropriate divisional chair and the written consent of the Director of the School of Music.

Grade Point Requirements

In all options, undergraduate music majors are required to earn a minimum grade of 2.0 in each course (core and elective) counted toward music degree requirements. An overall minimum GPA in music course work required for graduation is 2.50 for the B.A. or B.A.-B.Mus. double degree programs, and 3.20 for the B.Mus. program.

Pre-Core Preparation

In preparation for beginning the music core course work, all students must be evaluated by placement test to determine their levels in music theory and music history. Students who have minimal background in these areas may be required to take MUSIC 119 and 120 before beginning the music core.

Music Core Requirements

The music core (36 credits), required in each of the undergraduate program tracks, is as follows: MUSIC 201/204, 202/205, 203/206 (12 credits); MUSIC 301/304, 302/305, 303/306 (12 credits); MUHST 210, 211, 212 (9 credits); an approved 3 credit ethnomusicology course.

Bachelor of Arts

General Requirements: A minimum of 180 credits, of which 90 must be taken in departments other than the School of Music. All College of Arts and Sciences graduation requirements must be met. A cumulative GPA of 2.50 for all music courses and a 2.0 minimum grade for each music course is required for graduation.

Major Requirements

Music Theory-History Option: Music core, plus 6 credits of 300-level MUHST electives, 6 credits of 400-level MUSIC or MUHST electives, 10 credits of MUSAP vocal or instrumental private applied instruction, 5 credits of MUSEN (ensembles), for a minimum of 63 credits.

Vocal or Instrumental Option: Music core, plus 6 credits of approved upper-level MUSIC or MUHST electives, 18 credits of MUSAP vocal or instrumental private applied instruction, and 9 credits in ensembles, for a minimum of 69 credits.

Bachelor of Music

Admission Requirements: The Bachelor of Music majors are intended for specially qualified students who wish to emphasize professional training in performance or composition within a four-year program. Students should see the undergraduate adviser regarding special admission procedures for this program. Admission to the B.Mus. degree programs is accomplished by jury and special recommendation during the sophomore year.

General Requirements: A minimum of 180 credits, of which at least 60 must be taken in departments other than the School of Music. All College of Arts and Sciences degree requirements must be met (including Language Skills and Reasoning and Writing in Context), except that students need take only 55 credits in Areas of Knowledge, to include at least 20 credits each in two of the following three areas: Visual, Literary, & Performing Arts; Individuals & Societies; the Natural World. Of the 120 credits allowed in the School of Music, 100 may be in the major, but the additional 20 must be outside the primary area of the major (e.g., for applied music majors, 20 credits in non-performance areas).

Piano proficiency at MUSAP 235 level, a minimum grade of 2.0 in each music course counted toward the major, and a GPA of 3.20 in all music courses are required for graduation.

Applied Music Major Requirements

Guitar, Orchestral Instruments, Organ, Piano, Strings, and Voice: Music core (36 credits) plus: 9-15 credits of division-approved upper-level MUSIC or MUHST electives; 36 credits of MUSAP applied instruction; 1-2

credits of recitals; and 10-12 credits of MUSEN ensembles. Total major credits are 117-120. See the music undergraduate adviser for additional specific requirements in each area.

Composition: Music core (36 credits) plus: 9 credits of Division-approved upper-level electives; MUSIC 380, 381, 382, 395, 490, 471 or 472 (12 credits); 36 credits of private instruction in composition, 18 credits of MUSAP private applied music instruction, and 9 credits of MUSEN ensembles.

Jazz Studies: Music core (36 credits) plus: 9 credits of Division-approved upper-level electives; MUSIC 331 or 319, 425, 336, 436, 467, 468, 469, 379, 479 (15-18 credits); 6 credits of MUSIC 464, 10-12 credits of approved MUSIC electives; 30 credits of MUSAP private applied music instruction, 12 credits of MUSEN ensembles. See the music undergraduate adviser for special requirements in this program.

Bachelor of Arts and Bachelor of Music (Concurrent)

General Requirements: A minimum of 225 credits, of which 90 must be in areas other than music; all College of Arts and Sciences graduation requirements must be met. Of the remaining 135 credits, 115 may be in the major within the School of Music, but the additional 20 must be outside the primary area of the major (e.g., for applied music majors, in non-performance music areas).

Major Requirements: 2.50 GPA in all music courses, minimum grade of 2.0 in each music course counted toward the major, and piano proficiency at MUSAP 235 level are required for graduation. See the music undergraduate adviser for special requirements in ensembles, and for approved electives lists for each option.

Performance Options

Composition

Music core (36 credits) plus 15 credits of Division-approved upper-level electives; MUSIC 380, 381, 382, 395, 490, 471 or 472 (12 credits); 36 credits of private instruction in composition, 18 credits of MUSAP applied music instruction, and 12 credits of MUSEN ensembles.

Guitar

Music core (36 credits) plus 9 credits of Division-approved upper-level electives; MUSIC 380, 381, 382, 326, 327, 328, 434, 435, 436, 487 (or 438), 379, 479 (20 credits); 45 credits of MUSAP 338/438 applied instruction in guitar; 12 credits of MUSEN ensembles; 6 credits of additional music electives.

Jazz Studies

Music core (36 credits) plus 9 credits of Division-approved upper-level electives; MUSIC 331 or 319, 425, 336, 436, 467, 468, 469, 379, 479 (15-17 credits); 6 credits of MUSAP 233, 234, 235 or 301; 6 credits of MUSIC 464; 4-6 credits of approved MUSIC electives; 39 credits of MUSAP applied music instruction, 15 credits of MUSEN ensembles.

Orchestral Instrument

Music core (36 credits) plus 12 credits of Division-approved upper-level electives; MUSIC 380, 381, 382, 379, 479 (5 credits); 6 credits of MUSAP 233, 234, 235 or 301; 45 credits of MUSAP applied instruction on an orchestral instrument; 21 credits of MUSEN ensembles.

Organ

Music core (36 credits) plus 9 credits of Division-approved upper-level electives to include 6 cr. of MUHST at 300-level; MUSIC 350, 351, 352, 454, 458, 459, 473, 474, 487, 479, and one 3 cr. advanced analysis course (25 credits); 45 credits of MUSAP 322/422 applied instruction in organ; 15 credits of MUSEN ensembles; 5 credits of additional music electives;

Piano proficiency at MUSAP 321 level or 6 cr. of MUSAP 301. An optional junior recital is encouraged in preparation for senior recital.

Piano

Music core (36 credits) plus 9 credits of Division-approved upper-level electives to include 6 cr. of MUHST at the 300-level; MUSIC 326, 327, 328, 434, 435, 436, 487, 479, and one 3 cr. advanced analysis course (19 credits); 45 credits of MUSAP 321/421 applied instruction in piano; 15 credits of MUSEN ensembles; 11 credits of electives other than performance. An optional junior recital is encouraged in preparation for senior recital.

String Instrument

Music core (36 credits) plus 15 credits of Division-approved upper-level electives to include 6 cr. of MUHST at the 300-level; MUSIC 326, 327, 328, 329, 380, 434, 435, 436, 379, 479 (18 credits); 45 credits of MUSAP applied instruction on string instrument; 15-21 credits of MUSEN ensembles.

Voice

The voice faculty strongly recommends emphasis in languages, especially Italian, which may be used for the Language Skills requirement. SPHSC 300 is strongly recommended for 5 credits of the Natural World, and some course work in acting is also strongly recommended (e.g., MUSIC 465).

Music core (36 credits) plus 12 credits of Division-approved upper-level electives; MUSIC 307, 308, 309, 326, 327, 379, 479 (12 credits); 8 credits of advanced vocal repertoire; 45 credits of MUSAP applied instruction in voice; 13 credits of MUSEN ensembles; and 6 credits of music electives.

Academic Options

Music History

Admission Requirements: Formal application to music history division, to include verified completion of music core, 3.00 GPA in music core courses, 3.00 overall GPA, and a sample of writing. Completion of minimum entrance requirements does not guarantee admission. The program of study and preparation of senior thesis is developed in consultation with a music history faculty adviser. Students who intend to pursue graduate studies are strongly advised to establish proficiency in German or French and to acquire some acquaintance with one or two additional foreign languages.

Major Requirements: Music core (36 credits) plus 6 credits of 300-level MUHST electives, 36 credits of 400-level MUSIC or MUHST (minimum 12 courses); a 3 credit 400-level course in ethnomusicology; 3 credits of MUSIC 498; 18 credits of MUSAP applied instruction (3 years); 9 credits of MUSEN ensembles; and 24 credits of music electives.

Music Education

Instrumental or Choral General Emphasis leading to K-12 certification

Admission Requirements: Acceptance to program is by both performance audition and basic musicianship audition. Choral emphasis requires additional piano proficiency at MUSAP 235 level. Application to the Music Teacher Education Program is made to the music education faculty two quarters before part-time student teaching.

Major Requirements: Music core (36 credits) plus 5-8 credits of Division-approved upper-level electives; MUSIC 350, 351, 352 (or 380, 381, 382), MUSED 301, 302, 303, 340, 403, 440, 443, 452, 464, 465 (28 credits); 6 credits from a combination of MUSED 304, 305, 306 and 442 or 432 or both 442 and 432; 18 credits of applied techniques classes including MUSAP 220 (see adviser for list); 18 credits of MUSAP applied instruction;

tion; 12 credits of MUSEN ensembles; 2 credits of MUSIC or MUSAP 389; EDLPS 479, EDPSY 304, EDC&I 494 (9 credits).

(15 credits of MUSED 404, full-time student teaching is required for certification, but not graduation. Due to changes in state-mandated requirements, additional courses may be required for certification. For current certification requirements, always consult the music adviser and members of the music education faculty.)

Graduate Program

Graduate programs in the School of Music take into consideration the dual nature of music's subject matter. First, it is one of the creative arts, requiring constant renewal through the efforts of composers, performers, and teachers. Second, it is a branch of the humanities, subject to scholarly study and interpretation of its theoretical concepts and historical development. Advanced study presupposes an emphasis in one or the other direction without entirely neglecting the alternate aspect.

Special Requirements

Before admission to the Graduate School as a music major, the student must further qualify for a specific area of specialization. See below.

Financial Aid

A limited number of teaching and staff assistantships are available. Accompanists are also employed at hourly rates. Competitive auditions for performance scholarships for new and returning students are held each year. The School of Music office may be contacted for details.

Research Facilities

The Music Building contains the music library, an electronic composition laboratory, a listening center, ethnomusicology archives, and the usual studio, practice, and classroom facilities of a modern music department. Ensembles available for student participation include Opera, Contemporary Group, Collegium Musicum, and several non-Western ensembles among the many traditional large and small choral and instrumental groups.

Master of Music, Doctor of Musical Arts

The programs with more creative emphasis lead to the degrees of Master of Music and Doctor of Musical Arts. Areas of specialization: performance (piano, organ, harpsichord, voice, strings, other orchestral instruments), instrumental conducting, choral conducting, composition, and opera production. Except for composition, the Graduate Record Examination is not required for application to these graduate programs. All graduate students must maintain a GPA of at least 3.00, and a minimum grade of 3.0 in courses used to fulfill School of Music graduation requirements.

Master of Music

Admission Requirements: Audition required for entrance to performance and composition. Entrance to other areas by permission. Details of requirements for each of the areas of specialization are available from the School of Music Office of Graduate and Undergraduate Advising.

Graduation Requirements: 45 credits, of which 18 must be in courses at the 500 level or above. Demonstration of proficiency in one language from French, German, Italian, and Latin. *With thesis*—Program to include 9 credits in thesis. *Without thesis*—A final oral examination is required.

Doctor of Musical Arts

Admission Requirements: Audition required for performance and composition. Entrance to other areas by permission. Details of requirements for each of the

areas of specialization are available from the School of Music Office of Graduate and Undergraduate Advising.

Graduation Requirements: Three academic years of study; dissertation: in lieu of a full-length dissertation, a thesis in three parts may be substituted, of which one must be a research paper and two may be additional research papers, or musical compositions, or documented public performances, or documented lecture demonstrations. Demonstration of proficiency in one language (two languages for voice) from among French, German, Italian, and Latin, as soon as possible, but, in any case, before taking the General Examination.

Master of Arts, Doctor of Philosophy

The research-oriented programs lead to the degrees of Master of Arts and Doctor of Philosophy. Areas of specialization: music theory, music history, ethnomusicology, and music education. The Graduate Record Examination is required for application to some of these graduate programs. Check individual program requirements. All graduate students must maintain a GPA of at least 3.00, and a minimum grade of 3.0 in courses used to fulfill School of Music graduation requirements.

Master of Arts

Admission Requirements: Requirements vary for the different areas of specialization. Details of requirements for each of the areas of specialization are available from the School of Music Office of Graduate and Undergraduate Advising.

Graduation Requirements: 45 credits, of which 18 must be in courses at the 500 level or above and 9 in thesis. Except for music education, demonstration of proficiency in one language from among French, German, Italian, and Latin or another language as is necessary for research.

Doctor of Philosophy

Admission Requirements: Requirements vary for the different areas of specialization. Details of requirements for each of the areas of specialization are available from the School of Music Office of Graduate and Undergraduate Advising.

Graduation Requirements: Three academic years of study; dissertation. Except for music education, demonstration of foreign language proficiency as soon as possible, but, in any case, before taking the General Examination. Details of the General Examination requirements for each of the areas of specialization are available from the School of Music graduate program coordinator.

Faculty

Director

Robin L. McCabe

Professors

Beale, James M. * 1948, (Emeritus); MMus, 1947, Yale University; theory/composition.

Becker, Howard S. * 1991, (Adjunct); PhD, 1951, University of Chicago; sociology of art, sociology of science, qualitative methods.

Bernard, Jonathan W. * 1987; MA, 1973, MPhil, 1975, PhD, 1977, Yale University; theory and analysis of twentieth-century music.

Brown, Marshall J. * 1988, (Adjunct); PhD, 1972, Yale University; eighteenth- and nineteenth-century literature, literary theory, music and literature.

Campbell, Patricia S. * 1989; MM, 1975, University of Akron; PhD, 1981, Kent State University; music and child development, multicultural music education, comparative music education.

Carlsen, James C. * 1967, (Emeritus); MA, 1958, Washington University; PhD, 1962, Northwestern University; systematic musicology, psychomusicology, research methodology, theories of music instruction.

Chaloupka, Vladimir * 1981, (Adjunct); PhD, 1975, University of Geneva (Switzerland); experimental elementary-particle physics.

Curtis-Verna, Mary * 1969, (Emeritus); BA, 1943, Hollins College, Virginia; voice.

Dahlstrom, Robert A. * 1971, (Adjunct); MA, 1967, University of Illinois; scene design.

Dempster, Stuart R. * 1968; MA, 1967, San Francisco State; trombone, contemporary music.

Eichinger, Walter A. 1936, (Emeritus); MM, 1933, Northwestern University; organ.

Erös, Peter S. * 1989; Diploma, 1956, Franz Liszt Academy; orchestra and opera, works of Richard and Siegfried Wagner.

Gangoli, Ramesh A. * 1962, (Adjunct); PhD, 1961, Massachusetts Institute of Technology; probability theory, harmonic analysis on Lie groups.

Grossman, Arthur * 1968; Diploma, 1955, Curtis Institute of Music; bassoon.

Harman, R. Alexander 1966, (Emeritus); BM, 1949, University of Durham (UK); music history and literature.

Heinitz, Eva M. 1948, (Emeritus); studied at State Academy of Music (Berlin); violoncello.

Hokanson, Randolph H. * 1949, (Emeritus); studied with Dame Myra Hess, Howard Ferguson (London); piano.

Kaplan, Abraham * 1977; Diploma, 1957, Juilliard School; choral conducting.

Kappy, David L. * 1979; MM, 1971, University of Wisconsin; French horn performance, chamber music, and theory.

Kechley, Gerald * 1955, (Emeritus); MA, 1950, University of Washington; theory/composition.

Kind, Silvia E. 1969, (Emeritus); Konzert-Reife-Prüfung, 1934, Hochschule für Musik (Berlin); harpsichord.

Lundquist, Barbara R. * 1973, (Emeritus); MS, 1959, Montana State University; DMA, 1973, University of Washington; music education, sociomusicology, ethnomusicology in schools.

McCabe, Robin L. 1987; MMus, 1973, DMA, 1976, Juilliard School; concert piano performance, communication skill, pedagogy.

McColi, William D. * 1968; Diploma, 1955, State Academy of Music (Austria); clarinet.

Moore, John T. 1948, (Emeritus); MM, 1941, University of Illinois; piano.

O'Doan, Neal D. * 1966; MM, 1961, University of the Pacific; piano.

Rahn, John * 1975; MFA, 1972, PhD, 1974, Princeton University; theory/composition.

Sakata, Hiromi L. * 1977; MA, 1968, PhD, 1976, University of Washington; ethnomusicology.

Saks, Toby * 1976; MS, 1966, Juilliard School; performance and teaching of violoncello and chamber music.

Siki, Bela * 1985, (Emeritus); Diploma, 1948, Conservatoire De Musique (Switzerland); piano literature with special interest in interpretation and performance.

Skowronek, Felix E. * 1968; BMus, 1956, Curtis Institute of Music; flute.

Smith, William O. * 1966, (Emeritus); MA, 1952, University of California (Berkeley); theory/composition.

Sokol, Vilem 1961, (Emeritus); BMus, 1938, MMus, 1946, Oberlin College; violin, viola, conducting.

Starr, Lawrence * 1977; PhD, 1973, University of California (Berkeley); music history and literature.

Staryk, Steven S. * 1987; studied at the Royal Conservatory of Music (Toronto); violin.

Storch, Laila * 1968, (Emeritus); BA, 1964, Wilkes College, Pennsylvania; oboe.

Terry, Carole R. * 1979; MM, 1973, University of Rochester; DMA, 1977, Stanford University; organ, harpsichord.

Terry, Miriam 1930, (Emeritus); MA, 1948, University of Washington; music history and literature.

Thome, Diane * 1977; MA, 1966, University of Pennsylvania; PhD, 1973, Princeton University; theory/composition.

Tufts, Paul Dewitt 1961, (Emeritus); MA, 1951, University of Washington; theory/composition.

Verrall, John 1948, (Emeritus); BA, 1934, University of Minnesota; theory/composition.

Zsigmondy-Liedemann, Denes 1972, (Emeritus); BA, 1940, Gymnasium, Budapest; violin.

Associate Professors

Benshoof, Kenneth 1963, (Emeritus); MA, 1963, San Francisco State; theory/composition.

Berendsen-Bloch, Emilie * 1988; MA, 1963, University of Washington; performance and instruction of nineteenth- and twentieth-century vocal music.

Bozarth, George S. Jr. * 1982; MFA, 1973, PhD, 1978, Princeton University; music history and literature.

Collins, Douglas P. * 1980, (Adjunct); PhD, 1978, University of Missouri; twentieth-century French literature.

Dunlop, William M. * 1962, (Adjunct); MA, 1965, Cambridge University (UK); Shakespeare, nineteenth-century literature, poetry writing.

Ellingson, Terry J. * 1983; PhD, 1979, University of Wisconsin; MA, 1979, University of Chicago; ethnomusicology.

Geissmar, Else J. 1947, (Emeritus); MM, 1944, University of Michigan; piano.

Goolsby, Thomas W. * 1991; EdD, 1987, University of Illinois; music education: research in evaluation in the arts (specifically tests and measurements).

Jacobs, Sue-Ellen * 1974, (Adjunct); PhD, 1970, University of Colorado (Boulder); anthropological studies of women, applied anthropology, ethnohistory, Native North America.

Jussila, Clyde F. 1971, (Emeritus); MS, 1951, Kansas State University; music education.

Karpen, Richard S. * 1989; DMA, 1989, Stanford University; composition, computer music, and music theory.

Michaelian, Patricia * 1984; Diploma, 1970, Curtis Institute of Music; concert pianist: orchestral soloist, recitalist, and chamber musician.

Rosinbum, Ralph 1942, (Emeritus); MA, 1948, University of Washington; opera production.

Salzman, Timothy O. * 1987; MM, 1979, Northern Illinois University; wind ensemble conducting, pedagogy and repertoire.

Taricani, Jo Ann * 1980; PhD, 1986, University of Pennsylvania; music history and literature.

Waterman, Christopher * 1985; PhD, 1986, University of Illinois; ethnomusicology.

Assistant Professors

Demorest, Steven M. * 1993; MM, 1983, Westminster Choir College; PhD, 1989, University of Wisconsin; music education, choral ensembles.

Duisberg, Robert A. * 1988, (Research); MM, 1977, DMA, 1980, PhD, 1986, University of Washington; computer music, composition.

Durand, Joel-Francois * 1991; PhD, 1988, State University of New York (Stony Brook); composition.

Larson, Steven L. 1994; MA, 1981, University of Oregon; PhD, 1987, University of Michigan; Schenkerian theory, analysis and performance, expressive meaning in music, artificial intelligence.

Pelton, Carmen 1992; BMus, 1977, University of Wisconsin; voice.

Seales, Marc A. 1987; BA, 1978, Western Washington University; jazz studies, keyboard.

Will, Richard J. 1993; MA, 1989, PhD, 1994, Cornell University; music history.

Senior Artists in Residence

Patrick, Julian 1990; BA, 1950, Cincinnati Conservatory; voice.

Sheppard, Craig * 1993; MSc, 1971, Juilliard School; piano.

Artists in Residence

Bergman, Lisa E. 1988; BA, 1978, University of Washington; MM, 1980, State University of New York (Stony Brook); MM, 1982, Juilliard School; piano.

Crusoe, Michael 1990; BMus, 1974, University of Missouri; tympani.

Lieberman, Barry 1991; BA, 1971, Cleveland Institute of Music; string bass.

Tindemans, Margaretha E. 1987; Diploma, 1972, Conservatorium (Netherlands); viola da gamba, recorder.

Lecturers

Brockman, Michael S. 1987; MMus, 1982, New England Conservatory of Music; saxophone.

Collier, Thomas W. 1980; BMus, 1971, BA, 1971, University of Washington; percussion.

Cummings, Roy M. 1970; BA, 1961, University of Washington; trumpet, jazz.

Herbolzheimer, Bern H. 1984; MMus, 1973, University of Washington; vocal coaching.

McDavid, J. Brad 1994; MM, 1990, Arizona State University; music education, marching band.

Miller, Douglas 1993; BA, 1990, Antioch College; jazz bass.

Novacek, Steven A. 1984; BMus, 1975, California State University (Northridge); guitar.

Vokolek, Pamela C. 1968; MM, 1965, Cleveland Institute of Music; harp.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Music

Courses for Undergraduates

MUSIC 116, 117, 118 Elementary Music Theory (2, 2, 2) VLPA For nonmusic majors. 116: For people with no hands-on music experience. Rudiments of music; notation of time, small pitch structures (e.g., some scales, chords, rhythmic patterns), some analysis. 117: For students who can read music, having some performance experience. 118: For students who read music, have some performance experience, are familiar with scales, chords, intervals. Includes analysis composition in various styles. Prerequisites: some music training including ability to read music or 116 for 117; familiarity with scales, chords, intervals or 117 for 118.

MUSIC 119 Introduction to Music Theory and Musicianship (4) VLPA Durand, Karpen, Larson Basic elements of music theory: major and minor

scales, modes, keys, triads, and seventh chords. Introduction to acoustics, four-part writing, functional harmony, simple forms, and jazz notation. Includes concurrent, intensive aural training in lab sections. Prerequisite: placement by examination. Offered: A.

MUSIC 120 Survey of Music (5) VLPA Studies in listening, with emphasis on the changing components of Western art music. Illustrated lectures, laboratory section meetings, and presentations by guest artists.

MUSIC 121 The Orchestra (2) VLPA Development of the orchestra and its literature.

MUSIC 122 The Opera (2) VLPA An introduction to opera through selected masterworks, from Monteverdi to the present. Primarily for non-majors.

MUSIC 137, 138, 139 Class Instruction: Voice (1, 1, 1) VLPA Basic fundamentals of good singing: breathing, diction, voice focus. Materials include mainly early Italian art songs, some English and French songs. Designed primarily for Music Education majors. Prerequisites: audition and ability to sight read.

MUSIC 180 Anglo-American Folk Music (5) VLPA Genres and styles from earliest roots to the 1960s; Anglo-American ballads, dance music, French and other European immigrant groups.

MUSIC 161 American Musical Theater (5) VLPA Historical and stylistic study of the development of the American musical theater. European roots in opera and operetta. Contributions from jazz and popular music. Selected musicals studied.

MUSIC 162 American Popular Song (5) VLPA Historical, social, and stylistic study of popular idioms from the late nineteenth century to the present. Most attention to contemporary idioms (rock, country-western, soul, disco). Various facets of the industry examined to learn how they influence taste and musical style.

MUSIC 185 The Concert Season (2) VLPA Performances from the School of Music concert season, supplemented by lecture topics related to concert repertoire. Analysis of applicable musical topics appropriate for enhanced appreciation of historical and cultural contexts of works performed. Attendance at ten concerts required.

MUSIC 191 Composition (3, max. 9) VLPA One-hour private instruction and one-hour laboratory session each week. Intended to develop skill in creative musical expression. For composition majors only.

MUSIC 200 Music, Child, and Family (3) VLPA Campbell Study of music in childhood as part of socialization and enculturation of the child within family and community. Emphasis given to songs and music listening experiences provided by parents to nurture the child's musical, social, and intellectual development from infancy through middle childhood. For nonmajors.

MUSIC 201, 202, 203 First-Year Theory I, II, III (3, 3, 3) VLPA *Durand, Karpen, Larson* Core theory sequence for majors. 201: introduction to modal counterpoint and 16th-century polyphony through the species. 202: instruction in tonal harmony and counterpoint. 203: further instruction in total harmony and counterpoint; introduction to canon, modulation, and classical dance forms. Concurrent enrollment in 204 for 201, 205 for 202, 206 and MUHST 210 for 203. Prerequisites: 119 or equivalent and placement by examination for 201. Offered: W, Sp, A.

MUSIC 204, 205, 206 First-Year Ear Training (1, 1, 1) VLPA *Durand, Karpen, Larson* Core ear-training sequence for majors. Concurrent enrollment in 201 for 204, 202 for 205, 203 and MUHST 210 for 206. Prerequisite: placement by examination. Offered: W, Sp, A.

MUSIC 216, 217, 218 Introductory Composition (2, 2, 2) VLPA For students not majoring in composition. Prerequisite: 112.

MUSIC 237 Secondary Class Instruction: Voice (2, max. 6) VLPA Continuation of basic fundamentals of good singing: breathing, diction, voice focus and repertoire. Designed for students not yet prepared for private instruction. For music majors only. Prerequisites: audition or jury; 139.

MUSIC 270 World Popular Music (5) VLPA/ I&S *Waterman* A global survey of popular music, including Latin America, Africa, Eastern Europe, the Middle East, Asia, and the Pacific. Emphasis on students' ability to recognize styles and to analyze the social and historical processes that have shaped them.

MUSIC 291 Composition (3, max. 9) VLPA One-hour private instruction and one-hour laboratory session per week. Prerequisite: 191.

MUSIC 300 Music of Greater Mexico (3) VLPA/I&S Regional styles of Mexico; consideration of pre-Hispanic Indian origins and the music of Chicanos in the American Southwest.

MUSIC 301, 302, 303 Second-Year Theory (3, 3, 3) VLPA *Durand, Karpen, Larson* Core theory sequence for majors. 301: further study of form and modulation; introduction to chromaticism. 302: further study of chromaticism, including jazz usages; song form. 303: introduction to the theory and analysis of 20th-century music. Concurrent enrollment in 304 and MUHST 211 for 301, 305 and MUHST 212 for 302, 306 for 303. Prerequisites: 203, 206 and MUHST 210 for 301. Offered: W, Sp, A.

MUSIC 304, 305, 306 Second-Year Ear-Training I, II, III (1, 1, 1) VLPA *Durand, Karpen, Larson* Core ear-training sequence for majors. Concurrent enrollment in 301 and MUHST 211 for 304, 302 and MUHST 212 for 305, 303 and MUHST 213 for 306. Prerequisites: 206 and MUHST 210 for 304. Offered: W, Sp, A.

MUSIC 307, 308, 309 Diction for Singers (2, 2, 2) VLPA Application of basic rules of diction, enunciation, and articulation in Italian (302), German (303), and French (304). Materials include texts from the basic vocal repertoire. Primarily for the voice majors at freshman and sophomore levels; non-majors on a space-available basis.

MUSIC 310 Medieval/Renaissance Counterpoint (3) VLPA *Bernard, Durand, Karpen, Thome* Intensive study in the discipline of some contrapuntal style from the Medieval or Renaissance periods. Prerequisites: 212 and MUHST 215 or equivalent; to be taken concurrently with MUHST 313.

MUSIC 311 Tonal Counterpoint (3) VLPA *Bernard, Durand, Karpen, Thome* Basic techniques of baroque counterpoint and introduction to the fugue. Prerequisites: 212 and MUHST 215; to be taken concurrently with MUHST 314.

MUSIC 312 Twentieth-Century Techniques (3) VLPA Practical writing and analytical study of twentieth-century composition techniques from Debussy to the present.

MUSIC 313 Piano Technology (3) VLPA Evolution of the piano; intonation and temperament theory; principles of tuning, voicing, regulating, and evaluating pianos. Credit/no credit only. Prerequisite: permission of instructor.

MUSIC 316, 317, 318 Music Cultures of the World (5, 5, 5) VLPA/I&S 316: Near East, Central Asia, Far East, South and southeast Asia, Indonesia, and the Philippines. 317: Music of sub-Saharan Africa, Americas, and Oceania. 318: Folk and popular music in western and eastern Europe and the Americas.

MUSIC 319 Afro-American Music (5) VLPA/I&S Centers on Black music in the United States, but also clarifies the relationship of this music to the musics of other Afro-American cultures as well as to their African roots.

MUSIC 326, 327, 328 Repertoire (2, 2, 2) VLPA For music majors.

MUSIC 331 History of Jazz (3) VLPA Survey of the major periods and styles of jazz, New Orleans jazz to the avant-garde, and popular jazz of today. Studies the main characteristics of each style.

MUSIC 334 Band Arranging (2) VLPA Prerequisite: 212.

MUSIC 336 Jazz Arranging (2) VLPA Writing in jazz style for various instrumental combinations. To be able to arrange for modern jazz orchestra. Prerequisite: 212.

MUSIC 338 Baroque Ornamentation (2) VLPA *Terry* Musical ornamentation in France, Spain, England, Italy, and Germany from 1608 to 1800, with special reference to the harpsichord.

MUSIC 350, 351, 352 Choral Conducting (1, 1, 1) VLPA *Kaplan* Overview of choral conducting patterns. Score, voice warm-up, and intonation. Tempo fluctuation, left hand, diction, discipline. Designed for music and music education majors. Prerequisite: 212 for 350; 350 for 351; 351 for 352, or permission of instructor; to be taken concurrently with MUSEN 307, 507.

MUSIC 366 Cylinders to Platters—A Survey of Recorded Music Since 1888 (3) VLPA Music as reflected through the influences of the recording industry and the development of related technologies. Examines social and artistic impacts that the recording age has brought to American and European musical cultures. Recommended: 120 and/or 162.

MUSIC 367, 368, 369 Beginning Jazz Improvisation I, II, III (1, 1, 1) VLPA Beginning jazz improvisation techniques used in the performance of basic jazz styles such as the blues. Primarily for music majors. Prerequisite: 212 or permission of instructor.

MUSIC 379 Junior Recital (1) VLPA For participants in the Bachelor of Music degree program only. Prerequisite: permission of instructor.

MUSIC 380, 381, 382 Instrumental Conducting (1, 1, 1) VLPA *Salzman* Acquaints the beginning conductor with beat patterns and their expressive modifications, basic rehearsal techniques and score study. Prerequisites: 212 or permission of the instructor.

MUSIC 384 Ideas in Music (5) VLPA/I&S *Taricani* Examines selected sources and compositions of music from the Western tradition (from the tenth through the twentieth centuries), in relation to the intellectual background of the periods and countries that produced them. Musical studies accompanied by assigned readings in philosophical, religious, literary, and artistic texts in addition to the primary readings in musical history.

MUSIC 388 Jazz Pedagogy (2) VLPA Stylistic and esthetic developments in the performance of jazz. Key musical ingredients in the evolution of jazz as an art form and the skills commensurate with teaching these. Designed for music majors

MUSIC 390 Special Topics in Music (5) VLPA (5) Starr Topics vary.

MUSIC 391 Composition (3, max. 9) VLPA One-hour private instruction and one-hour laboratory session each week. Prerequisite: 291.

MUSIC 395 Compositions with Synthesizers (3, max. 9) VLPA *Karpen* Musical composition using special-purpose hardware music synthesizers, which may be interfaced to microcomputers in a music workstation system. Prerequisite: permission of instructor.

MUSIC 401 Computer Music Seminar 1 (3) VLPA *Karpen* Use of computers in musical composition, software digital sound synthesis, score generation, theoretical investigations. Prerequisites: 212 or 456 or

PHYS 207 or programming experience; permission of instructor.

MUSIC 402 Computer Music Seminar 2 (3) VLPA *Karpen* Use of computers in musical composition, digital sound synthesis, digital signal processing. Hardware used includes NeXT computers, digital recorders. Software used includes CSound, Common LISP, UNIX. Prerequisite: 401 or permission of instructor.

MUSIC 403 Computer Music Seminar 3 (3) VLPA *Karpen* Advanced use of computers for musical composition, digital sound synthesis, digital signal processing. Advanced synthesis techniques such as LPC for speech and vocal synthesis, phase vocoders, reverb, and spatial location. Hardware used includes NeXT computers and peripherals. Software includes CSound, Common Lisp, C, and UNIX. Prerequisite: 402 or permission of instructor.

MUSIC 425 Jazz History and Analysis (3) VLPA *Collier* Major eras and styles of jazz with emphasis on technical aspects of jazz music: composition, arranging, improvisation practices. Prerequisite: music major or permission of instructor.

MUSIC 426 Advanced Jazz Arranging (2) VLPA *Brockman* Advanced arranging techniques for jazz ensembles of various sizes, exploring methods employed by Duke Ellington, Gil Evans, and others. Assignments include one original arrangement each for small-combo and full-jazz ensemble. Prerequisite: 336 or permission of instructor. Offered: Sp.

MUSIC 427 Music of Africa (3) VLPA/I&S Music cultures of sub-Saharan Africa. Traditional styles and more recent developments. Open to all students with an interest in the area. Prerequisite: 317 or permission of instructor.

MUSIC 428 Music of North India (3) VLPA/I&S Classical music of North India, the Hindustani tradition with emphasis on the Dhrupad and Khayal styles. Recommended: some background in either ethnomusicology or South Asian Studies.

MUSIC 430 Organology (3) VLPA Systematic study of musical instruments, involving the history, acoustical phenomena, and physical topologies of instruments from around the world, with emphasis on non-Western music. Prerequisite: ethnomusicology major or permission of instructor.

MUSIC 433 Music of Latin America (3) VLPA/I&S The Indian, African, and European music of the Spanish-, French-, and Portuguese-speaking New World countries. Prerequisite: 318 or permission of instructor.

MUSIC 434, 435, 436 Pedagogy (2, 2, 2) VLPA Principles of effective studio teaching; survey and evaluation of teaching materials.

MUSIC 438 Problems in Contemporary Music Performance (3, max. 9) VLPA *Kappy* An active course examining and solving problems relevant to the successful performance of twentieth-century music. Preparation for complex rhythms, odd groupings, new notation, and extended performing techniques. Prerequisite: permission of instructor.

MUSIC 439 Music of Indonesia and the Philippines (3) VLPA/I&S Includes the gong culture traditions of Sumatra, Sunda, Java, Bali, Sunda Islands, and the Philippines. Open to students in music and to students with an interest in the area. Prerequisite: 316 or permission of instructor.

MUSIC 444 Music of the Near East (3) VLPA/I&S *Sakata* Classical and folk musical traditions of Iran, Turkey, and the Arab world. Prerequisite: 316 or permission of instructor.

MUSIC 445 Selected Topics in Ethnomusicology (3, max. 9) VLPA/I&S Deals with topics not covered by regular courses in ethnomusicology. Frequently

taught by visiting lecturers. Content varies with different instructors. Prerequisite: permission of instructor.

MUSIC 447 Music of Southern India (3) VLPA/I&S Classical music of South India, the Karnatic tradition, with emphasis on the concert repertoire. Recommended: background in either ethnomusicology or South Asian Studies.

MUSIC 448 Music of China (3) VLPA/I&S Confucian philosophies that relate to music, theory, scale systems, cosmology. Development of instrumental styles, vocal and dramatic regional forms from early historical periods to the present. Recommended: background in either ethnomusicology or East Asian Studies.

MUSIC 450 Percussion Education Institute (2) VLPA *Collier, Crusoe* Intensive four-week institute focusing on techniques in percussion, timpani, and mallet performance. Intended for music educators with little or no percussion experience desiring additional training to enhance their careers as music teachers. Includes private instruction, master classes, and percussion ensemble participation. Prerequisite: MUSAP 217 or permission of instructor.

MUSIC 451 Summer Jazz Institute (1) VLPA *Brockman, Collier, Cummings, Seales* Intensive one-week institute designed for the serious jazz student as well as for music educators. Six hours of daily instruction in jazz theory, ear-training, improvisation, arranging, as well as emphasis on rehearsal and performance techniques through sectional workshops and small group "jam sessions." Prerequisite: permission of instructor.

MUSIC 454 Organ Pedagogy (3) VLPA *Terry* Pedagogical approaches to organ techniques and performance practice, provides opportunity for practical application by means of student teaching.

MUSIC 455 Choral Arranging (3) VLPA Primarily for choral conductors who need to modify, arrange or compose material to suit the capabilities of specific choral groups and performance situations. Prerequisite: senior standing or permission of instructor.

MUSIC 458 Organ Repertoire: Middle Ages through Baroque (3) VLPA *Terry* Analysis and performance practices of organ literature, Middle Ages through baroque period. Development of the organ as musical instrument. Prerequisites: one 400-level history course, pre-1750, in addition to history core.

MUSIC 459 Organ Repertoire: Bach to Present (3) VLPA *Terry* Analysis and performance practices of organ literature, classical period through the twentieth century. Development of the organ as a musical instrument. Prerequisites: one 400-level history course, post 1750, in addition to history core.

MUSIC 460 Advanced Vocal Repertoire: Pre-Nineteenth-Century Art Songs (2, max. 6) VLPA Professional preparation of pre-nineteenth-century songs with a view to total artistic-musical realization in performance. Appropriate style, character, balance, phrasing, diction, and projection for vocalists and pianists. Prerequisite: 326, 327, 328 or permission of instructor.

MUSIC 461 Advanced Vocal Repertoire: Nineteenth-Century Art Songs (2, max. 6) VLPA Professional preparation of works from the literature of nineteenth-century German lieder, with a view to total artistic-musical realization in performance. Appropriate style, character, balance, phrasing, diction, and projection for vocalists and pianists. Prerequisite: 326, 327, 328 or permission of instructor.

MUSIC 462 Advanced Vocal Repertoire: Twentieth-Century Art Songs (2, max. 6) VLPA Preparation of works from the twentieth-century repertoire of French, German, Italian, Spanish, and English songs, with a view to total artistic-musical realization in

performance. Appropriate style, character, balance, phrasing, diction, and projection for vocalists and pianists. Prerequisite: 326, 327, 328 or permission of instructor.

MUSIC 464 Jazz Laboratory (1, max. 9) VLPA *Seales* Forum for testing new technical skills, improvisational techniques, and jazz compositions and/or arrangements in a formal laboratory setting. Prerequisite: concurrent enrollment in MUSAP 400 or higher, or permission of instructor.

MUSIC 465 Acting for Singers (2, max. 6) VLPA Workshop designed specifically for the singing actor, focusing on character analysis, movement, and audition department skills.

MUSIC 467, 468, 469 Advanced Jazz Improvisation I, II, III (1, 1, 1) VLPA *Collier, Seales* Performance techniques in jazz improvisation for the advanced student. Prerequisite: 369, 467 for 468; 468 for 469; or permission of instructor.

MUSIC 470 Contemporary Theories I: Tonal Music (3) VLPA Recent tonal theories, including an introduction to the various developments of the theories of Heinrich Schenker; not restricted to music written before 1900. Prerequisites: 312 and MUHST 215, or permission of instructor.

MUSIC 471 Contemporary Theories II: Non-Tonal Music, 1900-1950 (3) VLPA Includes both "free atonal" and "classical serial" music. Systematic analysis of works of Schoenberg, Webern, Berg and others. Prerequisites: 312 and MUHST 215, or permission of instructor.

MUSIC 472 Contemporary Theories III: Seminar in New Music (3, max. 6) VLPA Continuation of 471. Emphasis on the many organizational systems aspiring to extend or replace tonality: late Stravinsky and other semiserial matrix systems; "total serialism" and "systematic serialism" developed by and from Milton Babbitt; recent developments in non-serial "pitch-centric" and "set-centric" systems. Prerequisite: 471 or permission of instructor.

MUSIC 473, 474 Keyboard Harmony and Transposition (3, 3) VLPA *Terry* Keyboard harmonization from the baroque period to present; transposition of vocal and instrumental pieces to different pitch levels. Prerequisite: 312 for 473; 473 for 474, or permission of instructor. Offered: alternate years.

MUSIC 475 Figured Bass Realization (3) VLPA *Terry* Various styles of continuo realization for keyboardists, emphasizing Bach cantatas, Haydn symphonies, and Mozart operas. Prerequisite: 473 or permission of instructor. Offered: alternate years.

MUSIC 476 Advanced Vocal Repertoire: Seventeenth and Eighteenth Centuries (2) VLPA Opera repertoire, 1600 to the Bel Canto era (Bellini, Rossini, Donizetti); style, traditions, embellishments in Italian, French, and German arias. Prerequisites: 326, 327, 328 or permission of instructor.

MUSIC 477 Advanced Vocal Repertoire: Nineteenth Century (2) VLPA Opera repertoire, the post Bel Canto era through Verdi, Puccini and verismo, and significant German, French, and Slavic repertoire. Prerequisites: 326, 327, 328 or permission of instructor.

MUSIC 478 Advanced Vocal Repertoire: Twentieth Century (2) VLPA Opera repertoire, twentieth-century opera literature (Barber, Menotti, Bartok, Dvorak); understanding of style, character and overall artistic and musical needs of the present. Prerequisites: 326, 327, 328 or permission of instructor.

MUSIC 479 Senior Recital (1) VLPA Prerequisite: permission of instructor.

MUSIC 480 The Anthropology of Music (3) VLPA/I&S Analysis of aspects of anthropological thought influential in ethnomusicology. Critical evaluation of dominant theoretical schools and modes of explanation.

tion, e.g., evolutionist, diffusionist, historical particularist, structuralist, functionalist, symbolist, and semiotic, through detailed examination of seminal texts. Prerequisite: ethnomusicology major or permission of instructor. Offered: jointly with ANTH 430.

MUSIC 481 Choral Repertoire: Sixteenth and Seventeenth Centuries (3) VLPA Sacred and secular choral literature from the Renaissance through the early baroque, covering Europe and England. Various genres and styles of major composers, including performance practice, rehearsals, and conducting. Prerequisite: senior standing or above, or permission of instructor.

MUSIC 482 Choral Repertoire: Eighteenth Century (3) VLPA Sacred and secular choral literature of the baroque, covering mainland Europe and England. Choral works of Bach, his predecessors, and contemporaries. Stylistic analysis and study of performance practice. Prerequisite: senior standing or above or permission of instructor.

MUSIC 483 Choral Repertoire: Nineteenth Century (3) VLPA Sacred and secular choral literature of the nineteenth century, covering mainland Europe and England. Analysis of accompanied and a cappella choral works by major composers with implications for conducting and programming of literature. Prerequisite: senior standing or above or permission of instructor.

MUSIC 484 Choral Repertoire: Twentieth Century (3) VLPA Choral literature of the twentieth century, covering America, England, and mainland Europe. Various genres and styles, including score study and teaching strategies. Prerequisite: senior standing or above or permission of instructor.

MUSIC 487 Tonal Counterpoint (3) VLPA Durand, Karpen, Rahn Evaluation of fugue practices from the baroque era to the present. Prerequisite: 311.

MUSIC 488 Computer Applications to Music (3, max. 9) VLPA Music workstation applications using microcomputers, music synthesizers, and analog-to-digital converters: music editing and score production, transcription, waveform and spectral analysis, and introduction to programming.

MUSIC 489 Special Topics in Music Theory (3, max. 9) VLPA Prerequisites: 312, MUHST 314.

MUSIC 490 Orchestration (3) VLPA Study of the instruments of the orchestra and practical experience in combining them; to enable the student to score for various instrumental combinations. Ideally to be taken before band arranging or jazz arranging, but is not a prerequisite. Prerequisite: music major or permission of instructor.

MUSIC 491 Composition (3, max. 18) VLPA One-hour private instruction and one-hour laboratory session each week. Prerequisite: 391.

MUSIC 492, 493 Opera Direction and Production (4, 4) VLPA Practical experience with problems of the theater. Prerequisite: permission of instructor.

MUSIC 495 Music of Japan (3) VLPA/I&S Sakata Instrumental and dramatic forms including Gagaku, Sankyoku, Noh, and Kabuki, as well as regional and popular styles. Open to students in music and East Asian area studies. Prerequisite: 316 or permission of instructor.

MUSIC 498 Senior Thesis (3-, max. 9) VLPA Design and completion of an individual research project and writing of a thesis under supervision of a faculty member. Required of students in the pre-Systematic Musicology major; available to others with the permission of the appropriate program adviser. Prerequisite: permission of instructor.

MUSIC 499 Undergraduate Research (* max. 8)

Courses for Graduates Only

MUSIC 501, 502, 503 Seminar in Musical Analysis (3, 3, 3) 501: Chant to middle baroque. 502: High baroque through nineteenth century. 503: Impressionists to present.

MUSIC 511 Seminar in Field and Laboratory Methods (3) Methodology of research in ethnomusicology along with practical experience in recording and processing field and laboratory materials. Prerequisite: graduate student standing in ethnomusicology or permission of instructor.

MUSIC 512 Seminar in Ethnomusicology (3, max. 18) Study of methodological procedures in ethnomusicology applied to specific research problems. Prerequisite: graduate student standing in ethnomusicology or permission of instructor.

MUSIC 526, 527, 528 History of Theory (3, 3, 3) 526: Ancient, medieval, early Renaissance. 527: Renaissance, baroque, early classic. 528: Classic, romantic, twentieth century.

MUSIC 529 Aural Analysis (3) Formal structural and stylistic analysis of music based on the aural rather than the printed form of music. Develops and uses a vocabulary of stylistic features for identification of musical examples, which are drawn from various parts of the world.

MUSIC 531 Proseminar in Ethnomusicology (3) Theoretical and methodological practices in ethnomusicology based on existing major writings. Critical evaluations of works with a broad view toward developing ethnomusicological research. Prerequisite: permission of instructor.

MUSIC 532 Opera Direction and Production (4/6, max. 12) Practical experience with problems of the opera theatre.

MUSIC 533, 534, 535 Preceptorial Readings in Ethnomusicology (5, 5, 5) Significant ethnomusicological literature on the major music cultures. Prerequisite: graduate student standing in ethnomusicology and permission of instructor.

MUSIC 536 Transcription and Analysis (3) Study of practice in different notational analytical systems used in non-Western music. Prerequisite: graduate student standing in ethnomusicology and permission of instructor.

MUSIC 551 Practicum in Music Instruction (3, max. 9) Practical application and validation of results of investigation in curriculum, music teaching and learning, performance and theoretical studies. Prerequisite: teaching experience or permission of instructor.

MUSIC 559 Master's Recital (3, max. 9) Public performance for students in the Master of Music degree program. Prerequisite: permission of instructor and Master of Music program standing.

MUSIC 570 Seminar in Tonality (3, max. 9) Bernard, Larson, Rahn Advanced theoretical and analytical work in tonal music and related systems. Prerequisite: 470.

MUSIC 571 Seminar in Serialism (3, max. 9) Bernard, Larson, Rahn Advanced theoretical and analytical work in serialism and other nontonal systems. Prerequisite: 471 or equivalent.

MUSIC 572 Advanced Topics in Computer Music (3) Karpen, Rahn Topics vary. Offered: AWSps.

MUSIC 575 Seminar in Theory (3, max. 18) Bernard, Larson, Rahn Development and discussion of current student and faculty research in compositional/analytical theory and metatheory.

MUSIC 576 Critical Theory of Music (3, max. 18) Philosophical foundations of the criticism of music, including relevant contemporary thought in the criticism of literature and the other arts.

MUSIC 580, 581, 582 Advanced Conducting (3, max. 9; 3, max. 9; 3, max. 9) Eros, Karpen

MUSIC 583 Advanced Choral Conducting (3, max. 27) Kaplan

MUSIC 589 World Music Laboratory (3, max. 18) World music traditions taught by visiting artists with emphasis on cultural pedagogy and traditional theory. The particular culture studied changes from year to year. Required of all graduate students in ethnomusicology. Credit/no credit only.

MUSIC 590 Doctoral Recital (2-6, max. 18) Public performance for students in the Doctor of Musical Arts degree program. Prerequisite: permission of instructor.

MUSIC 591 Graduate Composition (* max. 30) Bernard, Durand, Karpen, Rahn, Thome

MUSIC 599 Advanced Selected Topics (1-3, max. 27) Selected readings on current issues and problems in music. Prerequisite: permission of a supervising music faculty member.

MUSIC 600 Independent Study or Research (*)

MUSIC 700 Master's Thesis (*)

MUSIC 800 Doctoral Dissertation (*)

Music History

Courses for Undergraduates

Courses 400 through 424—Prerequisite: 314.

MUHST 210, 211, 212 Introduction to the History of Western Music I, II, III (3, 3, 3) VLPA Bozarth, Starr, Introduction to the critical study of Western music history including representative composers, works, and genres as well as significant concepts and issues. 210: Origins of Western Music. 211: Baroque and Classical Periods. 212: Nineteenth and Twentieth Centuries. Concurrent enrollment in MUSIC 203 and 206 for 210, MUSIC 301 and 304 for 211, MUSIC 302 and 305 for 212. Prerequisite: MUSIC 120 or equivalent, music major, and placement by examination for 210. Offered: A, W, Sp.

MUHST 260 Orchestral Music (5) VLPA Orchestral music from its beginnings in the seventeenth century through recent developments; evolution of the symphony.

MUHST 261 Mozart (5) VLPA Introduction to Mozart's music and to musical life in Habsburg Austria during the Enlightenment. Mozart's musical personality studied through masterpieces in all genres, with principal emphasis on listening. Ability to read music not required.

MUHST 262 Introduction to Twentieth-Century Music (3) VLPA Starr Listener's survey of important composers and trends from Debussy through electronic music. Prerequisite: 120 or permission of instructor.

MUHST 263 Opera (5) VLPA Contributions of music, text, and staging; study of representative works concentrating on problems of combining these elements into a composite work of art.

MUHST 313, 314 Music Before 1750 (3, 3) VLPA 313: Sacred and secular music of the Middle Ages and Renaissance; 314: Music in the Baroque era, from Monteverdi to Bach, and its relationship to contemporary artistic, cultural, and political trends. Prerequisites: 215 and MUSIC 212 for 313; 313 for 314; to be taken concurrently with MUSIC 310, 311.

MUHST 330 Music in the United States (5) VLPA Contribution of music to the development of American culture.

MUHST 332 Music in European Society: Antiquity to 1700 (5) VLPA/I&S Music and its relationship to

aspects of European culture and society—philosophy, politics, social conditions, and the visual arts from antiquity to 1700. Prerequisite: MUSIC 120 or equivalent background.

MUHST 333 Music in European Society: 1700 to Present (5) VLPA/IS Music as related to other aspects of modern European culture and society—philosophy, politics, social conditions, and the visual arts. Prerequisite: MUSIC 120 or equivalent.

MUHST 400 Medieval Music: To 1400 (3) VLPA Taricani Gregorian chant through Machaut and Landini.

MUHST 401 Early British Music: 1300-1700 (3) VLPA Taricani Examines the history of British music from its earliest polyphony through the music of Purcell. Stylistic features of English music studied, including medieval polyphony, Tudor music, Elizabethan music, and seventeenth-century music through Purcell.

MUHST 402 Late Renaissance Secular Music: 1525-1630 (3) VLPA Taricani The madrigal in Italy, England, and Germany. The Chanson, Jannequin through Lassus.

MUHST 403 Late Renaissance Sacred and Instrumental Music: 1525-1630 (3) VLPA Taricani Latin church music. Willaert through G. Gabrieli; early Reformation church music, Walther through Gibbons; instrumental music, Cabezon, the English virginal school, and Sweelinck.

MUHST 404 Baroque Keyboard Music (3) VLPA Forms and styles: Frescobaldi through J.S. Bach and C.P.E. Bach.

MUHST 405 Orchestral Music: 1620-1760 (3) VLPA Corelli through the Mannheim School

MUHST 406 Baroque Choral Music (3) VLPA Monteverdi through Handel.

MUHST 407 Baroque Opera (3) VLPA Opera of the Baroque period.

MUHST 408 Keyboard Music: 1760-1830 (3) VLPA Haydn through Schumann.

MUHST 409 Chamber Music: 1760-1830 (3) VLPA Haydn through Schubert.

MUHST 410 Orchestral Music: 1760-1830 (3) VLPA Haydn through Berlioz.

MUHST 411 Art Song, 1760-1830 (3) VLPA The art song in European culture during the classical and early romantic periods.

MUHST 412 Choral Music: 1750-1830 (3) VLPA Large works for chorus and orchestra. Haydn through Berlioz.

MUHST 413 Opera: 1750-1830 (3) VLPA Gluck through Bellini.

MUHST 414 Keyboard Music: 1830-1915 (3) VLPA Liszt through Debussy.

MUHST 415 Chamber Music: 1830-1915 (3) VLPA Schumann through Ravel.

MUHST 416 Orchestral Music: 1830-1915 (3) VLPA Liszt and Brahms through early Schoenberg and Stravinsky.

MUHST 417 Art Song: 1830-1915 (3) VLPA Bozarth The Lieder of Schumann, Brahms, Wolf, Strauss, Mahler, and Schoenberg.

MUHST 418 Choral Music: 1830-1915 (3) VLPA Selected choral masterpieces. Brahms through Britten.

MUHST 419 Opera: 1830-1915 (3) VLPA Wagner through Puccini.

MUHST 420 Authenticity and Performance (3) VLPA The practical and philosophical issues raised by historically informed performance of early music on period instruments.

MUHST 421 Music Criticism (3) VLPA Starr Study of the various forms of music criticism, with an emphasis on the writing of valid examples and evaluation of one's own work along with that of others—classmates, journalists, and academic critics.

MUHST 423 Twentieth-Century Music: to 1945 (3) VLPA Starr Intensive study of selected composers and works exemplifying the new vocabularies, grammars, and styles of the early part of this century.

MUHST 424 Music Since 1945 (3) VLPA Starr Diversity of the contemporary musical scene. Vocabularies appropriate for the description and understanding of the new music, developed through study of representative composers and works, and appropriate readings.

MUHST 426 American Popular Music (3) VLPA Starr An in-depth consideration of American popular music styles and repertory from about 1920 to the present day. Analysis of representative pieces; consideration of critical and aesthetic issues relating to popular music; relationship of popular music to "art" music and to American culture and society. Prerequisites: 314 and MUSIC 312.

MUHST 429 Music, Literature, and the Arts (3) VLPA Literary and visual art works that include musical subject matter and forms; musical genres that incorporate such other arts as opera and ballet. Related philosophical writings. Includes works of a particular time period or investigation of a specific problem in comparative arts. Prerequisite: major in one of the arts, comparative arts, or related humanities field, or permission of instructor.

MUHST 497 Special Topics in Music History (1-3, max. 6) VLPA Topics vary each quarter.

Courses for Graduates Only

MUHST 500 Seminar in Methods of Music Research (3) Taricani Explores various critical approaches to research in music at the graduate level, examining specialized bibliographical resources, controversial arguments about musical issues, and other matters of musical criticism required to begin advanced study of music. Prerequisite for all graduate music history courses except 515.

MUHST 503 Readings in Medieval and Renaissance Music (5) Taricani Musical styles, genres, and forms of the middle ages and Renaissance. Focuses upon musicological problems and controversy related to music composed between ca. 1000 and 1600. Prerequisite: permission of instructor.

MUHST 504 Seminar in Medieval Music (3, max. 6) Taricani Prerequisite: 500.

MUHST 505 Seminar in Renaissance Music (3, max. 6) Taricani Prerequisite: 500.

MUHST 506 Seminar in Baroque Music (3, max. 6) Bozarth Prerequisite: 500.

MUHST 508 Seminar in the Viennese Classical Period: 1760-1830 (3, max. 6) Starr Prerequisite: 500.

MUHST 509 Seminar in Nineteenth-Century Music: 1830-1890 (3, max. 6) Bozarth Prerequisite: 500.

MUHST 510 Seminar in Music Since 1890 (3, max. 6) Starr Prerequisite: 500.

MUHST 515 Seminar in Medieval and Renaissance Notation (5) Taricani Gregorian chant through sixteenth-century prints.

MUHST 519 Seminar in Modern Editorial Procedures (5) Bozarth Study of modern procedures for preparing critical editions. Related areas of study may include analysis of musical style and historical and performance problems inherent in works being edited.

MUHST 520 Seminar in American Music (3, max. 6) Starr Research in the life, works, and times of composers in the United States from colonial days to the present. Prerequisite: 500 and undergraduate work in the history and analysis of twentieth century music.

MUHST 537 Seminar on Opera (3, max. 6) Starr in music history, providing a complement to history of opera series (MUHST 407, 413, 419). Prerequisite: MUHST 500.

Music Education

Courses for Undergraduates

MUSED 301, 302, 303 Musicianship for Teachers I, II, III (1, 1, 1) VLPA Applied experience for prospective music teachers in sight-singing, error detection, and keyboard skills relevant to the teaching of K-12 choral/vocal/general music. Performance techniques on the recorder (301), barred instruments (302), and guitar (303) as classroom instruments (with relevant literature). Prerequisite: 212, MUSAP 135.

MUSED 304, 305, 306 Elementary Instrumental Methods I, II, III (1, max. 3, 1, max. 3, 1, max. 3) VLPA Comprehensive examination of materials for training beginning instrumental students. Topics include recruiting, motivation, problems associated with evaluation. Methods of starting beginners and rehearsing ensembles are demonstrated with techniques addressing problems unique to young players on string, wind, percussion instruments. To be taken concurrently with MUSAP 205, 210 and/or 217.

MUSED 340 Music in Education (3) VLPA Campbell, Demorest Goolsby An orientation to the broad scope of issues regarding music in the schools (K-12), including curriculum, the development of instructional strategies, and evaluation techniques. Prerequisite: music major.

MUSED 401 Tin Pan Alley: Concepts and Teaching Strategies for Music Educators (1) VLPA Overview of Tin Pan Alley phenomenon that dominated the American popular music industry for nearly 70 years. For music educators. Focuses on cooperative learning strategies and performance considerations in the school environment. Recommended: MUSIC 162.

MUSED 402 Rock and Roll Roots for Music Educators (1) VLPA Overview of the musical and cultural roots of American Rock & Roll for music educators. Explores teaching strategies and performance possibilities in the school environment. Recommended: MUSIC 162.

MUSED 403 Part-Time Student Teaching in Music (6) VLPA Campbell, Demorest, Goolsby Supervised teaching internship. Directed observations of distinguished teachers in an elementary or secondary music setting. Weekly seminars. Offered: AWSp.

MUSED 404 Full-Time Student Teaching in Music (15) VLPA Campbell, Demorest, Goolsby Supervised teaching internship. Directed observations of distinguished teachers in an elementary or secondary music setting. Weekly seminars. Offered: AWSp.

MUSED 405 Marching Band Technique (2) VLPA Basics of marching and maneuvering discussed and used to write drill. Covers selection of music; use of marching procession, and show design. Students complete a drill for their own band or for an instrumentation determined by the instructor.

MUSED 410 Instrumental Rehearsal Techniques (3) VLPA Salzman Includes score preparation, rehearsal formats, and error detection. Prerequisite: basic conducting skills.

MUSED 431 Curriculum in Music Education (3, max. 6) VLPA *Campbell, Demorest, Goolsby* Principles and practices of curriculum design applied to the development of the music curriculum. Individual or group work on elementary and secondary school music curriculum projects. Prerequisite: music teaching, student teaching, or permission of instructor.

MUSED 432 Comprehensive Music in the Secondary School (3) VLPA *Campbell* The teaching of music and its literature in music classes other than traditional ensembles from grade four through adults.

MUSED 440 Music for Children (3) VLPA *Campbell* Identification and selection of appropriate objectives, materials, teaching strategies and evaluation techniques used in teaching music from birth through grade 3, with consideration of various approaches (e.g., Delcroze, Kodaly, Orff) for early childhood development in music.

MUSED 442 Instrumental Curriculum: Methods and Materials (3) VLPA *Goolsby* Study of the organization and administration of school instrumental music; the selection and use of materials and teaching strategies from beginning to advanced levels of instrumental instruction.

MUSED 443 Choral Curriculum: Methods and Materials (3) VLPA *Lundquist* Study of the organization and administration of school choral music; the selection and use of materials and teaching strategies from beginning to advanced levels of choral instruction. Prerequisites: 340 and permission of instructor.

MUSED 452 Ethnomusicology in the Schools (3) VLPA *Campbell* Issues, teaching materials, and techniques involved in incorporating music cultures of United States and related world music repertoires in K-12 classroom instruction.

MUSED 453 Approaches to Classroom Instruction: K-12 (3) VLPA *Campbell* Examines such major instructional approaches as MMCP, Orff, Kodaly, and Delcroze. Included are the philosophy of each and the methods, materials, and instructional skills needed for classroom application. Prerequisite: 340 or permission of instructor.

MUSED 464 Classroom Management (2) VLPA *Demorest* Provides future teachers with strategies and techniques for classroom management and discipline, and an opportunity to observe their usage in actual teaching and learning settings. Minimum 12 hours observation in public school music classrooms before student teaching. Offered: W.

MUSED 465 Evaluation of Music Education Programs (2) VLPA *Goolsby* Surveys standardized and alternative assessment techniques for placement, diagnostic, formative, and summative evaluation in music. Techniques include assessment and evaluation procedures for various areas of music education. Covers program as well as teacher evaluation.

MUSED 475 Teaching the Music of Selected Cultures (1, max. 6) VLPA *Campbell* Music and culture of a specific world region with particular attention to songs, stories, and instrumental pieces applicable to the teaching of music and the arts in elementary and secondary schools.

MUSED 480 Music Methods for Classroom Teachers (3) VLPA Addresses the basic fundamentals of music and methods for teaching K-6 school children. Topics include repertoire appropriate for different age levels, world music songs for children, and methods and materials for integrating music into the K-6 curriculum. Offered: Sp.

MUSED 496 Special Topics in Music Education (1-3, max. 10) VLPA Special studies designed to reflect contemporary emphases and concerns in the music education profession.

Courses for Graduates Only

MUSED 501 Introduction to Research in Music Education (3) *Campbell* Seminar in research design and method with emphasis on identification of problems in music instruction, interpretation of data, and application of findings to classroom settings.

MUSED 502 Quantitative Research in Music Education (3) *Campbell, Demorest, Goolsby* Seminar in quantitative research utilizing experimental, quasi-experimental, and descriptive design, with emphasis on the pursuit of solutions to pedagogical problems through appropriate research procedures, analysis, and interpretation of findings. Prerequisite: 501.

MUSED 503 Ethnographic and Historical Research in Music Education (3) *Campbell, Demorest, Goolsby* Examination of ethnographic and historical modes of inquiry relevant to music instruction in classroom, studio, and community settings. Prerequisite: 502.

MUSED 523 Tests and Measurement (3) *Goolsby* Examination of currently published aptitude and achievement tests in music and their uses in music education. Explores the basic methods for constructing classroom tests and their use in evaluation. Selected readings include researching test construction and application of tests and measurement to program evaluation.

MUSED 524 Seminar in Music Education (3) Special problems in the teaching and supervision of music in the elementary grades. Prerequisite: one year of teaching experience.

MUSED 525 Seminar in Music Education (3) Special problems in the teaching and administration of music in the secondary school and community college. Prerequisite: one year of teaching experience.

MUSED 530 Administration and Supervision in Music Education (3) *Goolsby* Survey of issues in policy and systems for facilities, student/personnel, technology, school/community relations, and special programs in music education. Focuses on evaluating and improving existing programs. Includes supervision of student teachers.

MUSED 535 Seminar in Musical Development (3) *Demorest* Critical review of theories, methods of inquiry, designs, and conclusions of research in musical development from early childhood through adolescence. Emphasis on evaluating theories and methods of studying musical development and exploring their relationship to theories of general intellectual development; adult music cognition research; and curriculum and practice in music education. Offered: W.

MUSED 540 History of American Music Education (3) *Goolsby* A chronological examination of individual, social, and political events, and educational philosophies, that characterized the development of music instruction in American schools from colonial times to the present.

MUSED 542 Comparative Music Education (3) *Campbell* A transcultural examination of philosophy and practice of music instruction.

MUSED 550 Proseminar in Music Education (3) Examination of the major literature in the philosophy, history, psychology, and sociology of formal school music instruction.

MUSED 560 Contemporary Issues in Music Education (1-3, max. 6) *Campbell, Demorest, Goolsby* Seminar focusing on review of literature on psychological and sociological aspects of music education, including historical and philosophical foundations of music education in the United States. Appropriate for MA students seeking guidance in preparation of topic for examinations. Prerequisite 24 credits towards the MA.

MUSED 561 Seminar in Theories of Music Instruction (3, max. 9) *Campbell, Demorest, Goolsby* Theories of music instruction, with special attention to curriculum, instructional procedures, and assessment of learning. Prerequisite: 555 or permission of instructor.

MUSED 575 Seminar in Research Applications (1-3, max. 6) *Campbell* Seminar in music education to discuss problems and issues facing American music teachers; to distinguish research-based music instruction and pedagogy from "common wisdom"; and to provide a venue for guest speakers. Offered: A.

Music Ensemble

Courses for Graduates and Undergraduates

Courses 100 and 302 are open to all students without audition. All other ensembles are open to majors and nonmajors with an audition or permission of instructor. Graduate students should register for the 500-level ensemble courses.

MUSEN 100 University Singers (1, max. 15) VLPA Credit/no credit only.

MUSEN 300, 500 University Symphony Orchestra (1, max. 15; 1, max. 9) VLPA

MUSEN 301, 501 Wind Ensemble (1, max. 15; 1, max. 9) VLPA *Salzman*

MUSEN 302, 502 Symphonic Band (1, max. 10; 1, max. 6) VLPA *Salzman*

MUSEN 303, 503 Marching Band (2, max. 10; 2, max. 6) VLPA Credit/no credit only.

MUSEN 304, 504 Percussion Ensemble (1, max. 12; 1, max. 9) VLPA *Collier*

MUSEN 305, 505 Brass Ensemble (1, max. 12; 1, max. 9) VLPA *Kappy*

MUSEN 306, 506 Woodwind Ensemble (1, max. 12; 1, max. 9) VLPA *Skowronek*

MUSEN 307, 507 University Oratorio Chorus (1, max. 15; 1, max. 9) VLPA *Kaplan* Credit/no credit only.

MUSEN 325, 525 Accompanying (2, max. 30; 2, max. 18) VLPA *Bergman*

MUSEN 340, 540 Vocal Jazz Ensemble (1, max. 6; 1, max. 9) VLPA Credit/no credit only.

MUSEN 345, 545 Jazz Workshop (1, max. 12; 1, max. 9) VLPA *Collier, Seales*

MUSEN 346, 546 Studio Jazz Ensemble (1, max. 6; 1, max. 9) VLPA *Cummings* **MUSEN 347, 547 Opera Chorus (1, max. 12; 1, max. 9) VLPA** *Kaplan*

MUSEN 350, 550 University Chorale (1, max. 12; 1, max. 9) VLPA Credit/no credit only.

MUSEN 351, 551 Madrigal Singers (1, max. 15; 1, max. 9) VLPA Credit/no credit only.

MUSEN 361, 561 Piano Ensemble (1, max. 3; 1, max. 9) VLPA *O'Doan* Study and performance of works for four hands at one or two pianos. Designed for upper-level piano majors or students with equivalent ability. Prerequisite: permission of instructor.

MUSEN 368, 568 Harp Ensemble (1, max. 12; 1, max. 9) VLPA *Vokolek*

MUSEN 369, 569 Baroque Chamber Ensemble (1, max. 9) VLPA *Terry, Tindemans* Prerequisite: permission of instructor.

MUSEN 375, 575 Opera Workshop (1, max. 6; 1, max. 9) VLPA Preparation of music theatre reper-

toire. Intended for the mature voice student. Prerequisite: permission of instructor.

MUSEN 380, 580 Sinfonietta (1, max. 6; 1, max. 9) VLPA

MUSEN 381, 581 Chamber Music (1, max. 18; 1, max. 9) VLPA Prerequisite: student is at MUSAP 300 level or above.

MUSEN 382, 582 Opera Theatre (2, max. 6; 2, max. 18) VLPA Public performance of roles in opera.

MUSEN 383, 583 Collegium Musicum (1, max. 6; 1, max. 9) VLPA Tindemans

MUSEN 384, 584 Contemporary Group (1, max. 6; 1, max. 9) VLPA Dempster Exploration of notation and performance problems in today's music; preparation for public performance. Credit/no credit only.

MUSEN 448 Advanced Studio Jazz Ensemble (1, max. 9) VLPA Cummings Preparation and performance of material appropriate to large jazz ensemble concerts, clinics, and radio and television broadcasts. Prerequisite: permission of instructor. Recommended: three quarters of 346.

MUSEN 465, 466, 467 Duo-Sonata Repertoire (2, 2, 2) VLPA 465: the classical period; 466: the romantic period; 467: the twentieth century. Prerequisite: undergraduate piano performance degree or permission of instructor.

Music Applied

Open to majors and nonmajors by audition. Courses 300-319 are private instruction for nonmajors. Courses 500-519 are private instruction for graduate nonmajors and graduate performance majors who have not yet been formally admitted by jury examination to the 520-539 level. (Please note that graduate students must advance to the 520-539 level within the first three quarters of study or withdraw from the program.)

MUSAP 133, 134, 135 Basic Keyboard (2, 2, 2) VLPA Michaelian Keyboard harmony and simple keyboard pieces. Class instruction. Prerequisites: ability to read notes (treble and bass clefs).

MUSAP 136 Basic Jazz Keyboard (2, max. 6) VLPA Seales Basics of jazz and pop chord voicings, reading lead sheets, basic accompanying in various jazz and pop styles. Prerequisites: audition and basic knowledge of music theory.

MUSAP 205 String Techniques (2, max. 12) VLPA Designed to prepare music education students to teach beginning and intermediate strings in the public schools.

MUSAP 210 Wind Techniques (2, max. 12) VLPA Designed to prepare music education students to teach beginning and intermediate woodwinds and brass in the public schools.

MUSAP 217 Percussion Techniques (2, max. 4) VLPA Collier The study of basic percussion techniques as they apply to music in the public schools. Acquaints the prospective music education major with percussion performance and teaching techniques. Prerequisite: music education major.

MUSAP 218 Guitar Techniques (1, max. 3) VLPA Novacek Includes exercises to develop a good basic technique emphasizing correct position and movement of both hands, basic folk song accompaniments including a variety of strums, finger picking patterns, hammering on and bass runs, reading guitar music, classical pieces, special effects, and access to other styles.

MUSAP 220 Musical Instrumental Digital Interface Systems Techniques (2) VLPA Overview of MIDI (Musical Instrumental Digital Interface) technology and practical applications of other music technologies in the school environment. Primarily for music education majors.

MUSAP 221 Secondary Musical Instrumental Digital Interface Systems Techniques (2) VLPA Explores further applications in the use of MIDI technology in the school environment. Focuses on editing and performance techniques involving a complex MIDI workstation. Primarily for music education majors. Prerequisite 220.

MUSAP 233, 234, 235 Secondary Piano (2, 2, 2) VLPA Focus is on advanced keyboard skills and piano repertoire. Prerequisite: 135 for 233; 233 for 234; 234 for 235. Consists of a half-hour private lesson every week.

MUSAP 239 Secondary Piano (2, max. 8) VLPA Intermediate level keyboard repertoire. Private instruction. Prerequisite: 235.

MUSAP 300, 500 Private Instruction: Voice (2-3, max. 45; 2-3, max. 45) VLPA Berendsen, Patrick, Pelton

MUSAP 301, 501 Private Instruction: Piano (2-3, max. 45; 2-3, max. 45) VLPA Herman, McCabe, Michaelian, O'Doan, Seales, Sheppard

MUSAP 302, 502 Private Instruction: Organ (2-3, max. 45; 2-3, max. 45) VLPA Terry

MUSAP 303, 503 Private Instruction: Harpsichord (2-3, max. 45; 2-3, max. 45) VLPA Terry

MUSAP 304, 504 Private Instruction: Violin-Viola (2-3, max. 45; 2-3, max. 45) VLPA Staryk

MUSAP 305, 505 Private Instruction: Violoncello (2-3, max. 45; 2-3, max. 45) VLPA Saks

MUSAP 306, 506 Private Instruction: Double Bass (2-3, max. 45; 2-3, max. 45) VLPA Lieberman

MUSAP 307, 507 Private Instruction: Flute (2-3, max. 45; 2-3, max. 45) VLPA Skowronek

MUSAP 308, 508 Private Instruction: Oboe (2-3, max. 45; 2-3, max. 45) VLPA

MUSAP 309, 509 Private Instruction: Clarinet (2-3, max. 45; 2-3, max. 45) VLPA McColl

MUSAP 310, 510 Private Instruction: Bassoon (2-3, max. 45; 2-3, max. 45) VLPA Grossman

MUSAP 311, 511 Private Instruction: Saxophone (2-3, max. 45; 2-3, max. 45) VLPA Brockman

MUSAP 312, 512 Private Instruction: Horn (2-3, max. 45; 2-3, max. 45) VLPA Kappy

MUSAP 313, 513 Private Instruction: Trumpet (2-3, max. 45; 2-3, max. 45) VLPA Cummings

MUSAP 314, 514 Private Instruction: Trombone (2-3, max. 45; 2-3, max. 45) VLPA Dempster

MUSAP 315, 515 Private Instruction: Tuba (2-3, max. 45; 2-3, max. 45) VLPA Salzman

MUSAP 316, 516 Private Instruction: Harp (2-3, max. 45; 2-3, max. 45) VLPA Vokolek

MUSAP 317, 517 Private Instruction: Percussion (2-3, max. 45; 2-3, max. 45) VLPA Crusoe

MUSAP 318, 518 Private Instruction: Guitar (2-3, max. 45; 2-3, max. 45) VLPA Novacek

MUSAP 319, 519 Private Instruction: Viola da Gamba (2-3, max. 45; 2-3, max. 45) VLPA Tindemans

Courses 320-339, 420-439 are private instruction for undergraduate music majors.

MUSAP 320, 420 Private Instruction: Voice (2-3, max. 27; 2-3, max. 27) VLPA Berendsen, Patrick, Pelton

MUSAP 321, 421 Private Instruction: Piano (2-3, max. 27; 2-3, max. 27) VLPA Herman, McCabe, Michaelian, O'Doan, Seales, Sheppard

MUSAP 322, 422 Private Instruction: Organ (2-3, max. 27; 2-3, max. 27) VLPA Terry

MUSAP 323, 423 Private Instruction: Harpsichord (2-3, max. 27; 2-3, max. 27) VLPA Terry

MUSAP 324, 424 Private Instruction: Violin-Viola (2-3, max. 27; 2-3, max. 27) VLPA Staryk

MUSAP 325, 425 Private Instruction: Violoncello (2-3, max. 27; 2-3, max. 27) VLPA Saks

MUSAP 326, 426 Private Instruction: Double Bass (2-3, max. 27; 2-3, max. 27) VLPA Lieberman

MUSAP 327, 427 Private Instruction: Flute (2-3, max. 27; 2-3, max. 27) VLPA Skowronek

MUSAP 328, 428 Private Instruction: Oboe (2-3, max. 27; 2-3, max. 27) VLPA

MUSAP 329, 429 Private Instruction: Clarinet (2-3, max. 27; 2-3, max. 27) VLPA McColl

MUSAP 330, 430 Private Instruction: Bassoon (2-3, max. 27; 2-3, max. 27) VLPA Grossman

MUSAP 331, 431 Private Instruction: Saxophone (2-3, max. 27; 2-3, max. 27) VLPA Brockman

MUSAP 332, 432 Private Instruction: Horn (2-3, max. 27; 2-3, max. 27) VLPA Kappy

MUSAP 333, 433 Private Instruction: Trumpet (2-3, max. 27; 2-3, max. 27) VLPA Cummings

MUSAP 334, 434 Private Instruction: Trombone (2-3, max. 27; 2-3, max. 27) VLPA Dempster

MUSAP 335, 435 Private Instruction: Tuba (2-3, max. 27; 2-3, max. 27) VLPA Salzman

MUSAP 336, 436 Private Instruction: Harp (2-3, max. 27; 2-3, max. 27) VLPA Vokolek

MUSAP 337, 437 Private Instruction: Percussion (2-3, max. 27; 2-3, max. 27) VLPA Collier, Crusoe

MUSAP 338, 438 Private Instruction: Guitar (2-3, max. 27; 2-3, max. 27) VLPA Novacek

MUSAP 339, 439 Private Instruction: Viola da Gamba (2-3, max. 27; 2-3, max. 27) VLPA Tindemans

MUSAP 340, 440 Timpani (2-3, max. 27; 2-3, max. 27) VLPA Crusoe

MUSAP 341, 441 Mallet Percussion (2-3, max. 27; 2-3, max. 27) VLPA Collier

MUSAP 389 World Music (2-3, max. 18) VLPA/ I&S World music traditions taught by visiting native artists. Consult ethnomusicology staff for current offerings. Credit/no credit only.

MUSAP 442 Jazz and Non-Western Drumming Techniques (2/3) VLPA Collier Focused study of American jazz drumming and/or hand drumming techniques of various world music cultures to broaden the skills of percussion students, preparing them for new demands of contemporary musical styles. Designed primarily for music majors enrolled in the percussion program.

Courses 520-539 are private instruction for graduate performance majors in the Masters of Music degree program. Courses 570-589 are private instruction for graduate performance majors who have been formally admitted by jury examination to the DMA degree program.

MUSAP 520, 570 Private Instruction: Voice (3, max. 18; 3, max. 27) VLPA Berendsen, Patrick, Pelton

MUSAP 521, 571 Private Instruction: Piano (3, max. 18; 3, max. 27) McCabe, Michaelian, O'Doan, Sheppard

MUSAP 522, 572 Private Instruction: Organ (3, max. 18; 3, max. 27) Terry

MUSAP 523, 573 Private Instruction: Harpsichord (3, max. 18; 3, max. 27) Terry

MUSAP 524, 574 Private Instruction: Violin-Viola (3, max. 18; 3, max. 27) Staryk

MUSAP 525, 575 Private Instruction: Violoncello (3, max. 18; 3, max. 27) Saks

MUSAP 526, 576 Private Instruction: Double Bass (3, max. 18; 3, max. 27) Lieberman

MUSAP 527, 577 Private Instruction: Flute (3, max. 18; 3, max. 27) Skowronek

MUSAP 528, 578 Private Instruction: Oboe (3, max. 18; 3, max. 27)

MUSAP 529, 579 Private Instruction: Clarinet (3, max. 18; 3, max. 27) McColl

MUSAP 530, 580 Private Instruction: Bassoon (3, max. 18; 3, max. 27) Grossman

MUSAP 531, 581 Private Instruction: Saxophone (3, max. 18; 3, max. 27) Brockman

MUSAP 532, 582 Private Instruction: Horn (3, max. 18; 3, max. 27) Kappy

MUSAP 533, 583 Private Instruction: Trumpet (3, max. 18; 3, max. 27) Cummings

MUSAP 534, 584 Private Instruction: Trombone (3, max. 18; 3, max. 27) Dempster

MUSAP 535, 585 Private Instruction: Tuba (3, max. 18; 3, max. 27) Salzman

MUSAP 536, 586 Private Instruction: Harp (3, max. 18; 3, max. 27) Vokolek

MUSAP 537, 587 Private Instruction: Percussion (3, max. 18; 3, max. 27) Collier, Crusoe

MUSAP 538, 588 Private Instruction: Guitar (3, max. 18; 3, max. 27) Novacek

MUSAP 540, 590 Timpani (3, max. 18; 3, max. 27) Crusoe

MUSAP 541, 591 Mallet Percussion (3, max. 18; 3, max. 27) Collier

MUSAP 542, 592 Private Instruction: Viola da Gamba (3, max. 18; 3, max. 27) Tindemans

MUSAP 589 World Music Laboratory (2-3, max. 18) World music traditions taught by visiting artists with emphasis on cultural pedagogy and traditional theory. The particular culture studied changes from year to year. Required of all graduate students in ethnomusicology. Credit/no credit only.

Near Eastern Languages and Civilization

229B Denny

Undergraduate Program

The program focuses on the languages and civilizations of the Islamic Near and Middle East and the Semitic Near East, with an emphasis on the ancient and medieval roots of these civilizations as well as

more recent cultural developments. Each of the languages offered represents a major literary tradition. Arabic, Persian, Turkish, and Central Asian Turkic are the languages of the most significant literary manifestations of Islamic civilization, while Hebrew is the language of the Old Testament and Judaism. The languages are taught in conjunction with their sociocultural context, so that linguistic skills will be formed and enhanced by a broad and sympathetic understanding, and a firm foundation will be laid for both intellectual exploration and practical experience.

Bachelor of Arts

Major Requirements

Near Eastern Languages and Civilization: An approved program of 30 credits, excluding elementary and intermediate language courses, in courses offered by the department or courses on the Near East offered by other departments, or both, plus at least 9 credits in literature or text courses at the 400 level in the major language. Usually intermediate language courses are a prerequisite for these advanced courses. All majors are required to take N E 210 and one of the following: N E 211, N E 240, or RELIG 210. Study opportunities in the Near East and in Central Asia are available on a competitive basis for a limited number of students.

Near Eastern Civilization: Two years of one Near Eastern language or its equivalent as evidenced by examination; N E 210; one of the following: N E 211, N E 240, or RELIG 210; 20 credits in Near Eastern courses including at least one course from each of the following areas: Near Eastern civilization, Near Eastern religion, Near Eastern literature in translation; 8 credits in non-language, upper-division courses related to the Near East in the department or in other departments; a senior essay on a topic of Near Eastern civilization (5 credits).

Minor

Minor Requirements: 25 credits including N E 210; one course from N E 211, 240, RELIG 210; additional credits from Near Eastern civilization or language courses (may not include language courses at the beginning or intermediate level).

Graduate Program

Master of Arts

The Department of Near Eastern Languages and Civilization offers a graduate program of studies leading to the Master of Arts degree. The program is designed to provide students with advanced training in at least one Near Eastern language and in a specific field of specialization. Students may concentrate in Arabic, Hebrew, Persian, Turkish, or Central Asian Turkic and may choose as their field of specialization a civilization or literature related to their language of concentration. The program is intended not only for those students who wish to continue their studies at the doctoral level but also for students who wish to pursue careers in government or business.

Admission Requirements: Statement of purpose; a sample of written work; three letters of recommendation, of which at least two must attest to scholarly ability. Although knowledge of a Near Eastern language is not a prerequisite for admission, applicants are generally expected to have had the equivalent of two years' study of the language in which they plan to concentrate.

Graduation Requirements: Departmental requirements, in addition to those required by the Graduate School for the Master of Arts degree, include a reading knowledge of French or German, or, with the prior approval of the student's M.A. Committee, any other language pertinent to the research in the student's field of study; a seminar paper representing the student's best work; a written examination consisting of four

parts: (1) on the general culture of the Near East, (2) on the student's field of specialization, (3) on the student's language of concentration, (4) on a second Near Eastern language related to the language of concentration.

Fulfillment of these requirements normally entails the completion of at least two years of study.

Doctor of Philosophy

Some of the department faculty are part of an interdisciplinary faculty group which offers doctoral study in Near and Middle Eastern Studies. The program is located administratively within The Graduate School. For a description of the program, see the Interdisciplinary Graduate Degree Programs section of this catalog.

Correspondence and Information

The Graduate School, Box 351240
(206) 365-9051

Summer Programs

The department offers Summer Intensive Language programs in Arabic, Hebrew, and Central Asian languages (Uzbek, Kazakh, Tajik, and others).

Research Facilities

The University of Washington libraries hold an extensive collection of books and materials in the languages of the Near East, the Turkic regions of Central Asia, and in European languages on Near Eastern and Central Asian Turkic subjects. Candidates for the master's degree as well as doctoral students will find in the collection adequate resources for their research.

Currently, the library participates in the Library of Congress Middle East Cooperative program for the acquisition of Arabic serials, and the Library of Congress Cooperative program for Pakistan for the purchase of Persian books and serials.

The library staff includes Near East and Central Asia specialists responsible for acquiring and cataloging the collection.

The library maintains book exchanges with the Central Asian Republics, some of these beginning as early as 1961. They are handled through the Near East Section of the University's Suzzallo Library. Among its staff are an exchange librarian and a specialist trained in Central Asian Turkic languages. A book exchange with Xinjiang is administered through the East Asia Library.

Financial Aid

Teaching assistantships are available for graduate students in the department who are fluent in speaking and writing a Near Eastern language. A limited number of graduate fellowships are also available.

Exchange Agreements

The University of Washington and the Department of Near Eastern Languages and Civilization maintain exchange agreements for graduate students and faculty with the following universities and institutions: American University in Cairo, Egypt; Hebrew University of Jerusalem—Israel; Tashkent University—Uzbekistan. In addition the department maintains a direct exchange agreement with Xinjiang University, Urumchi, People's Republic of China; established exchanges and cooperation with the Oriental Institute at the Tajik Academy of Sciences, Dushanbe; and participates in an agreement of scholarly exchanges and cooperation with the Uzbek Writers' Union, the Uzbek Academy of Sciences, and the Kazakh Academy of Sciences.

The department is an institutional member of the following organizations which also offer opportunities for study and research abroad: Center for Arabic Study Abroad in Cairo (CASA), American Research Center in Egypt, and the American Research Institute in Turkey.

Correspondence and Information

Chair
229B Denny, Box 353120

Faculty

Chair

Naomi B. Sokoloff

Professors

Becharach, Jere L. * 1967, (Adjunct); MA, 1962, Harvard University; PhD, 1967, University of Michigan; history of the Middle East, Islamic.

Cirtautas, Ilse D. * 1968; PhD, 1958, University of Hamburg (Germany); Turkic languages and literatures.

Heer, Nicholas L. * 1965, (Emeritus); PhD, 1955, Princeton University; Arabic language and literature, Islamic theology and philosophy.

Jaffee, Martin S. * 1987, (Adjunct); PhD, 1980, Brown University; rabbinic religion and literature in late antiquity.

MacKay, Pierre A. * 1966, (Emeritus); PhD, 1964, University of California (Berkeley); Greek literature, post-classical and Byzantine Greek literature, numismatics.

Williams, Michael A. * 1976, (Adjunct); PhD, 1977, Harvard University; early Christianity and religions of antiquity.

Ziadeh, Farhat J. * 1966, (Emeritus); LLB, 1940, University of London (UK); Arabic language and literature, Islamic law, Islamic institutions.

Associate Professors

Karimi-Hakkak, Ahmad * 1985; PhD, 1979, Rutgers University; Persian language and literature, Iranian culture and civilization.

Sokoloff, Naomi B. * 1985; PhD, 1980, Princeton University; Hebrew language and literature.

Assistant Professors

DeYoung, Terri Lynn * 1991; PhD, 1988, University of California (Berkeley); Arabic language and literature.

Silay, Kemal * 1993; PhD, 1993, Indiana University; Turkish language and literature, Ottoman philology and literature, Turkish folklore.

Senior Lecturer

Stilo, Donald L. 1988; PhD, 1971, University of Michigan; Iranian and Middle Eastern linguistics.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

Arabic

ARAB 401 Intensive Elementary Arabic (15) Study of grammar, with oral and written drill and reading of simple texts. (Cannot be taken for credit if 411, 412, 413 taken.) Offered: S.

ARAB 411, 412, 413 Elementary Arabic (5, 5, 5) Study of grammar, with oral and written drill and reading of simple texts. (Cannot be taken for credit if 401 taken.) Prerequisites: 411 for 412, 412 for 413.

ARAB 414, 415, 416 Spoken Arabic (3, 3, 3) Study of grammar with emphasis on oral drill in modern spoken Arabic (Western or Eastern).

ARAB 421, 422, 423 Intermediate Arabic (5, 5, 5) **VLPA** Reading of selected texts in standard Arabic,

with continuing emphasis on grammar and syntax. Prerequisites: 401 or 413 for 421, 421 for 422, 422 for 423 or equivalent.

ARAB 431, 432, 433 Advanced Arabic (3, 3, 3) **VLPA** Designed to impart to the student an active knowledge of Arabic structure and syntax and to increase his or her vocabulary power through supervised composition, translation into Arabic, and precis of expository writings. Particular emphasis is placed on journalistic articles and editorials. Prerequisite: 423 or equivalent for 431, 431 for 432, 432 for 433.

ARAB 451 Adab Prose: Jahiz (3) VLPA Readings in early Arabic prose, especially the writings of Jahiz. Prerequisite: 423 for 431, 431 for 432, 432 for 433.

ARAB 452 Maqamat: Hamadhani, Hariri (3) VLPA **MacKay** Reading of several maqamat (essays in rhymed prose) of al-Hamadhani and al-Hariri. Examination of the maqamat genre as a whole. Prerequisite: 423 or equivalent.

ARAB 453 Historians: Tabari (3) VLPA/I&S Readings in Arab historians with particular reference to al-Tabari and his school of historical writing. Prerequisite: 423 or equivalent.

ARAB 454 Qur'an and Tafsir (3) VLPA Reading of various sections from the Qur'an with the relevant exegetical writings on religious, philological, and grammatical points. Prerequisite: 423 or equivalent.

ARAB 455 Hadith and Law (3) VLPA Selected readings from the traditions (hadith) of Muhammad, and from works on jurisprudence and law based on the holy texts. Prerequisite: 423 or equivalent.

ARAB 456 Islamic Political Theorists (3) VLPA/I&S Readings from the main political theorists: al-Baghdadi, al-Mawardi, and Ibn Khaldun. Prerequisite: 423 or equivalent.

ARAB 457 Arabic Grammatical Texts (3) VLPA Introduction to the concepts and terminology of traditional Arabic grammar. Readings in the grammatical literature supplemented by instructor's lectures and written exercises. Prerequisites: good command of Arabic and permission of instructor.

ARAB 458 Modern Poetry (3) VLPA **DeYoung** Neoclassical poetry of the nineteenth and twentieth centuries, and the development of modern verse. Prerequisite: 423 or equivalent.

ARAB 459 Islamic Philosophical Literature (3) VLPA/I&S Reading of selected texts by representative Islamic philosophers. Prerequisite: 423 or equivalent.

ARAB 460 Islamic Theological and Mystical Literature (3) VLPA Reading of selected texts representative of Islamic theological and mystical schools. Prerequisite: 423 or equivalent.

ARAB 461 Modern Prose (3) VLPA **DeYoung** Modern essays, fiction, and ideological writings. Prerequisite: 423 or equivalent.

ARAB 490 Supervised Study (1-6 max. 18) Special work in literary texts for graduates and undergraduates. Prerequisite: 423 or equivalent and permission of instructor.

ARAB 499 Undergraduate Research (1-6 max. 18) Prerequisite: permission of instructor.

Coptic

COPTC 411 Introduction to Coptic (3) **Williams** Elements of grammar of the Sahidic dialect of the Coptic language.

COPTC 422, 423 Readings in Coptic (3, 3) VLPA **Williams** Readings from ancient Coptic Christian literature, with emphasis on the Nag Hammadi Gnostic texts. Prerequisite: 411 or equivalent.

Hebrew

HEBR 401 Intensive Elementary Modern Hebrew (15) Intensive study of grammar, with oral and written drill and reading of simple texts. (Cannot be taken for credit if 411, 412, 413 taken.) Offered: S.

HEBR 411, 412, 413 Elementary Modern Hebrew (5, 5, 5) **Sokoloff** Modern Israeli Hebrew. Core vocabulary, grammar, conversational text, and oral and written communication. Excerpts from modern Hebrew prose and poetry. (Cannot be taken for credit if 401 taken.) Prerequisites: 411 for 412, 412 for 413 or equivalent.

HEBR 421, 422, 423 Intermediate Modern Hebrew (5, 5, 5) VLPA **Sokoloff** Readings of selected texts in modern Hebrew with continuing emphasis on grammar and syntax. Prerequisites: 401 or 413 for 421, 421 for 422, 422 for 423 or equivalent.

HEBR 451, 452, 453 Introduction to Hebrew Literature (3, 3, 3) VLPA **Sokoloff** Literary texts and analysis. Grammar, composition, and dictionary skills. Primarily modern texts—short poetry, fiction, and essays—with some selections as well from biblical passages, the liturgy, midrash, and medieval poetry. Prerequisite: 423 or permission of instructor.

HEBR 454 Hebrew Poetry (3) VLPA **Sokoloff** Selections of poetry by prominent twentieth-century Hebrew poets whose texts comment or elaborate on biblical texts. Original source considered side-by-side with modern poetry, to examine ways recent literature models itself on, draws upon, and revises traditional sources. Prerequisite: 423 or permission of instructor.

HEBR 455 Hebrew Fiction (3) VLPA **Sokoloff** Selections of fiction by prominent modern Hebrew writers, including S.Y. Agnon, Aharon Appelfeld, David Shahar, Aharon Megged, and others. Prerequisite: 423 or permission of instructor.

HEBR 490 Supervised Study (1-6 max. 18) Special work in literary texts for graduates and undergraduates. Prerequisite: 423 or equivalent and permission of instructor.

HEBR 499 Undergraduate Research (1-6 max. 18) Prerequisite: permission of instructor.

Persian

PRSAN 401 Intensive Elementary Tajik (15) Intensive study of grammar with oral and written drill and reading of selected texts in Tajik, the literary language spoken and written in the Central Asian Republic of Tajikistan. Offered: S.

PRSAN 411, 412, 413 Elementary Persian (5, 5, 5) Conversation, pronunciation, and graded reading. Persian alphabet and basic sentence constructions. Offers rudimentary conversational and reading ability with a vocabulary of about two thousand words. Prerequisites: 411 for 412, 412 for 413 or equivalent.

PRSAN 421, 422, 423 Intermediate Persian (5, 5, 5) VLPA Reading of simple texts with emphasis on reading and writing, conversation skills, grammar, and syntax. Builds a vocabulary of standard Persian in preparation for advanced reading and comprehension of literary texts. Prerequisites: 413 for 421, 421 for 422, 422 for 423 or equivalent.

PRSAN 431, 432, 433 Advanced Persian (3, 3, 3) VLPA Designed to improve reading and writing skills. Graded reading and writing and exposure to the writing system, textual history, newspaper reading, and translation. Cultural materials presented as appropriate. The art of calligraphy introduced. For students with a degree of proficiency in spoken Persian. Prerequisite: 423 or equivalent.

PRSAN 451 Introduction to Persian Literature (3) VLPA **Karimi-Hakkak** Selected texts from modern and classical Persian poetry and prose. Provides insights into Iranian culture and its past and present.

achievements in literature. Prepares the student for a more comprehensive and critical study of Persian literature. Prerequisite: 423 or equivalent.

PRSAN 452 Modern Persian Literature: A Survey (3) VLPA *Karimi-Hakkak* Development of poetry and prose after Iran fell and absorbed the impact of Western cultures. Periods and genres. Works of such authors as Jamalzadeh, Hedayat, Dehkoda, Al-e Ahmad, Nima, Sepehri, and Forugh. Prerequisite: 423 or equivalent.

PRSAN 453 Classical Persian Literature: A Survey (3) VLPA *Karimi-Hakkak* History of Persian literature from Rudaki to Hafiz. Studies epic, lyric, and mystic traditions placed in historical settings. Covers the most important genres such as the Qasida, the Ghazal, the Ruba'i and the Masnavi. Prerequisite: 423 or equivalent.

PRSAN 454 The Epic Tradition in Iran (3) VLPA *Karimi-Hakkak* Focuses on the Shahnameh of Ferdowsi: explores the ancient legends that gave rise to it and follows the fortunes of epic poetry after Ferdowsi, touching on the rise, development, and decline of romance in classical Persian literature. Prerequisite: 441 or equivalent.

PRSAN 455 The Persian Ghazal (3) VLPA *Karimi-Hakkak* The Ghazal as the leading medium for lyrical expression in classical Persian tradition. Follows this genre from conception to culmination in the poetry of Hafiz. Conventions and devices of the Ghazal. Development placed in historical and social context. Prerequisite: 441 or equivalent.

PRSAN 456 Sufism: Thought and Expression (3) VLPA/IS *Karimi-Hakkak* Dynamics of mystical thought and expression as evolved in the writings of the great Sufi masters and reflected in the poetry of Sana'i, Attar, Rumi, and others. The fundamental unity of the mystical vision, with special attention to the peculiarities of individual style and expression. Prerequisite: 441 or equivalent.

PRSAN 490 Supervised Study (1-6 max. 18) Special work in literary texts for graduates and undergraduates. Prerequisite: 423 or equivalent and permission of instructor.

PRSAN 499 Undergraduate Research (1-6 max. 18) Prerequisite: permission of instructor.

Turkic

TKIC 401 Intensive Elementary Uzbek (15) Intensive study of grammar, with oral and written drill and reading of simple texts in Uzbek. Covers first year Uzbek. Cannot be taken for credit if 411, 412, 413 taken. Offered: S.

TKIC 402 Intensive Elementary Kazakh (15) Intensive study of grammar, with oral and written drill and reading of simple texts in Kazakh. Covers first year Kazakh. Cannot be taken for credit if 414, 415, 416 taken. Offered: S.

TKIC 403 Intensive Elementary Kirghiz (15) Intensive study of grammar with oral and written drill of selected texts. Offered: S.

TKIC 404 Intensive Intermediate Uzbek (15) VLPA Allows students to complete second year Uzbek in one quarter. Reading of selected texts in Uzbek, with continuing emphasis on oral and written practice, grammar, and advanced readings. Cannot be taken for credit if 421, 422, 423 taken. Prerequisite: 401 or 413 or equivalent. Offered: S.

TKIC 405 Intensive Intermediate Kazakh (15) VLPA Allows students to complete second year Kazakh in one quarter. Reading of selected texts in modern literary Kazakh, with emphasis on grammar, syntax, and oral practice. Prerequisite: 402 or 416 or equivalent. Offered: S.

TKIC 411, 412, 413 Elementary Uzbek (5, 5, 5) *Cirtautas* Introduction to the modern written and spoken language. Cannot be taken for credit if 401 taken.

TKIC 414, 415, 416 Introduction to Kazakh (3, 3, 3) *Cirtautas* Position of Kazakh within the community of other Turkic languages; alphabets used for Kazakh; reading of texts from Kazakhstan and China (Xinjiang); oral and written exercises. Cannot be taken for credit if 402 taken.

TKIC 417, 418, 419 Introduction to Uighur (3, 3, 3) *Cirtautas* Phonology, morphology, and syntax of Uighur.

TKIC 421, 422, 423 Intermediate Uzbek (3, 3, 3) *VLPA* *Cirtautas* Continuation of elementary Uzbek. Oral work, grammar, and readings in Uzbek literature. Prerequisites: 402 or 413 for 421, 421 for 422, 422 for 423.

TKIC 451 Introduction to Turkic Studies (3) VLPA *Cirtautas* Bibliography, problems, and methods of research in the field of Turkic studies for advanced students of Turkish/Turkic languages, including readings in those languages on the languages, literatures, and ethnography of past and present Turkic peoples. Prerequisite: permission of instructor.

TKIC 454, 455, 456 Introduction to Uzbek Literature (3, 3, 3) VLPA *Cirtautas* Readings from selected Uzbek writers. Content varies. Prerequisite: permission of instructor.

TKIC 490 Supervised Study (1-6 max. 18) Special work in literary texts for graduates and undergraduates. Prerequisite: 404, 405, or 423 or equivalent and permission of instructor.

TKIC 499 Undergraduate Research (3-5 max. 15) For Turkic language and literature majors. Prerequisite: permission of instructor.

Turkish

TKISH 411, 412, 413 Elementary Turkish (5, 5, 5) Introduction to modern Turkish. Pronunciation and conversation, grammar and composition, graded reading. Latin characters used throughout.

TKISH 421, 422, 423 Intermediate Turkish (5, 5, 5) *VLPA* Introduction to modern Turkish literature. Prerequisite: 413 for 421, 421 for 422, 422 for 423 or equivalent.

TKISH 451 Readings in Turkish Literary History I: Modern (3) VLPA The development of modern Turkish literature and its ties to, and divergence from, the Ottoman tradition. Readings in modern and Tanzimat poetry, short story, drama, and novel. Prerequisite: permission of instructor.

TKISH 452 Readings in Turkish Literary History II: Literature of the Ottoman Empire (3) VLPA The parallel development of the classical high-culture literature and the popular literatures of the Ottoman Empire. Readings in poetry, history, travel literature, drama, and popular narrative forms. Prerequisite: 423 or equivalent.

TKISH 453 Ottoman Travelers and Geography (3) VLPA *MacKay* Introduction to the geographic literature of Ottoman Turkish: readings from traditional cosmographies, travel journals, sailing instructions (portulans), ambassadorial and secret service reports. Prerequisite: 456 or permission of instructor.

TKISH 454 Turkish Literary Genres: Prose (3) VLPA Major genres, styles, and themes of Turkish art-prose from Ottoman times to present; creation of stylistic and critical norms. Prerequisite: 423 or equivalent.

TKISH 455 Turkish Literary Genres: Poetry (3) VLPA Poetic traditions of Turkey with a focus on the development of peculiarly Turkish aspects of style and structure. Social functions of poetry and the poetic milieu. Prerequisite: 423 or equivalent.

TKISH 456 Introduction to Ottoman Turkish (3) VLPA Introduction to Turkish in Arabic characters to cover the peculiar grammatical and syntactical problems of Ottoman. Prerequisite: permission of instructor.

TKISH 490 Supervised Study (1-6 max. 18) Special work in literary texts for graduates and undergraduates. Prerequisite: 423 or equivalent and permission of instructor.

TKISH 499 Undergraduate Research (1-6 max. 18) Prerequisite: permission of instructor.

Near Eastern Languages and Civilization

Courses in English

NEAR E 210 Introduction to Islamic Civilization (5) VLPA/IS Major developments in Islamic civilization from advent of Islam in seventh century to present. Islamic history, law, theology, and mysticism, as well as the politics, cultures, and literatures of the various Islamic societies. Offered: jointly with SISME 210.

NEAR E 211 Islam (5) VLPA/IS Religious and cultural milieu of Arabia before Muhammad; Muhammad's call and struggle to establish the new faith; Qur'anic content and style; Western and Muslim scholarship and the Qur'an; place of traditions in the Islamic edifice; Muslim political and religious thought; sources of Muslim religious law; and modern Muslim movements. Offered: jointly with RELIG 211.

NEAR E 212 Qur'an in English (3) VLPA/IS Survey of the contents of the sacred scripture of Islam, regarded by Muslims throughout the world as the literal word of God. Treats Qur'anic narrative, law, theology, and ethics. Some attention also given to the Qur'an as an historical document and to Qur'anic scholarship by non-Muslims. Offered: jointly with RELIG 212.

NEAR E 230 Themes in Near Eastern Literature (5) VLPA, IS Significant and interesting aspects of Near Eastern culture and society as represented by literary themes. Aspects of Near Eastern life and art such as women, minority groups, mysticism, and modern literature. Content varies.

NEAR E 240 Introduction to the Bible: Old Testament (5) VLPA *Jaffee* Introduction to the Hebrew Bible in English. Results of modern critical studies on the Bible and the ancient Near East. Concentrates on the meaning of Biblical records in their own time and environment. Offered: jointly with RELIG 240.

NEAR E 242 Cultural History of Turkey: From Empire to Nation (5) VLPA/IS *Silay* Topics include: social, economic, and political structures of Ottoman and Turkish Anatolia; language, literature, and artistic tradition; social status of women, literacy and illiteracy, the secular enterprise of Kemal Ataturk; Islamic fundamentalism, educational institutions, Kurdish nationalism. Offered: W.

NEAR E 250 Iranian Culture and Civilization (3) VLPA/IS *Karimi-Hakkak* Explores the culture and civilization of this Middle Eastern society through a multi-disciplinary approach that includes such manifestations as architecture, carpet-weaving, story-telling, and the composition of poetry.

NEAR E 251 Jewish Life in Literature and Film (3) VLPA/IS Major themes of Jewish life treated in modern narrative and cinema. Topics include religious tradition and modernity, Jewish immigration to America, responses to the Holocaust and Zionism.

NEAR E 260 The Middle East in Film (3) VLPA/IS *Albright* The cinema of Egypt, Iran, Israel, Turkey, and other Middle Eastern nations; compares and contrasts the films with Middle Eastern literature from the twentieth century. Both films and literature illustrate how Middle Easterners view the world: their concepts of self versus society, religion, art, and politics.

NEAR E 310 Modern Near Eastern Literatures in English Translation (3) VLPA Contemporary cultures of the Middle East studied through exposure to a representative sample of their literary work. Texts selected address major issues in Middle Eastern societies, e.g. tradition versus modernity, national identity and the challenge of the West, Arab-Israeli conflict.

NEAR E 325 Modern Hebrew Literature in English (3) VLPA Sokoloff Major developments in Hebrew literature from the Enlightenment to the current Israeli literature. Examines the development of modern Hebrew thought and literary style.

NEAR E 350 The City of Cairo (3) VLPA/IS MacKay Development of Fustat and Cairo, 600-1800, with special emphasis on art and architecture. Consideration of the economic, social, and geographical influences on the creation of the distinctive Egyptian styles of Islamic art. Offered: jointly with ART H 350.

NEAR E 363 Oral Literature of the Turkic Peoples of Central Asia I: the Heroic Epos (3) VLPA Cirtautas Representative heroic poems of Central Asian Turkic peoples now living in the Central Asian Republics and China. Origin of the heroic epos, its relation to the romantic epos and other oral literary genres. Art of the singer and his role in nomadic Turkic society. Emphasis on Manas, the monumental epos of Kirghiz. Offered: jointly with TKIC 363.

NEAR E 375 Turkic Peoples of Central Asia (3) I&S Cirtautas History of the Turkic peoples, AD 552 to present. Emphasis on current status of Turkic peoples in Central Asia. Geographical distribution, demographic data, reactions and adaptations to changes resulting from the 1917 revolution. Turkic viewpoint on past and present developments. Offered: jointly with SISRE 375.

NEAR E 402 Classical Arabic Literature in Translation (3) VLPA DeYoung Examines development of Arabic literature from its beginnings through the fall of the Abbasid dynasty to the Mongols. Coincides with period when Arabic language and literature were dominant forces in Islamic civilization. Topics include: impact of Islam on the literature, courtly love, mystical poetry, the Thousand-and-One Nights, and Hispano-Arabic literature.

NEAR E 420 Islamic Theological Literature in English (3) VLPA Readings from Mu'tazilite and Ash'arite works and from traditionalist works opposed to theology.

NEAR E 421 Islamic Mystical Literature in English (3) VLPA Readings from the works of principal Sufi writers and poets.

NEAR E 422 Islamic Philosophical and Scientific Literature in English (3) VLPA Readings in philosophy, the physical sciences, and medicine.

NEAR E 423 Persian Literature in Translation (3) VLPA Karimi-Hakkak Designed to familiarize students with an expanding collection of works translated from Persian literature, both classical and modern, into English. Focuses on a few representative texts and offers interpretations of the culture through close readings. Prior acquaintance with Iranian culture not required.

NEAR E 425 Current Trends in Modern Near Eastern Literature and Criticism (3) VLPA Modern literary tradition of the Near East with emphasis on major literary movements and/or genres and literary criticism in the modern period. The literatures of the Arab world, Persia, Turkey, and Israel are considered in alternate quarters.

NEAR E 432 Islamic Literature on Jurisprudence and Law in English (3) VLPA/IS The origins of the *shari'ah*, its development throughout the Islamic period, and the modern reform of this law.

NEAR E 440 Calligraphy in Islamic Culture (3) VLPA Survey of the esthetics, uses, interpretations of artistic writing in Islamic culture with a "hands on"

approach to recognizing, appreciating, and creating Arabic script calligraphy. Students need not know Arabic script nor have calligraphic talents, although some familiarity with Islamic civilization is helpful.

NEAR E 442 Turkish Literature in Translation (3) VLPA Silay Covers major theoretical issues concerning Ottoman court literature and Turkish epic and troubadour poetry. Major writers and works of modern Turkish literature read and analyzed in their social, political, and theoretical contexts. Previous study of Turkish literature not required. Prerequisite: upper division or graduate standing.

NEAR E 450 Survey of the Cultures of the Turkic Peoples of Central Asia (3) VLPA/IS Cirtautas Nomadic and sedentary cultures of the Turkic peoples of Central Asia. Emphasis on language, literature, and adherence to traditional modes of life. Offered: jointly with SISRE 450.

NEAR E 490 Supervised Study (1-6, max. 18) Special work in Near Eastern studies for graduates and undergraduates. Prerequisite: permission of instructor.

NEAR E 495 Trends in the Contemporary Middle East (3) I&S Bacharach, De Young Perspectives on cultural, political, and other aspects of Middle Eastern societies. Focuses on background complexities rather than immediate political-military confrontations. Topics vary. Recommended: previous course work on Middle East. Offered: jointly with SISRE 495.

NEAR E 496 Special Studies in Near Eastern Languages and Civilization (3-5, max. 15) VLPA Offered occasionally by visitors or resident faculty. Content varies.

NEAR E 499 Undergraduate Research (1-6, max. 18) Prerequisite: permission of instructor.

Courses for Graduates Only

Arabic

ARAB 600 Independent Study or Research (*)

Hebrew

HEBR 600 Independent Study or Research (*)

Persian

PRSAN 600 Independent Study or Research (*)

Turkic

TKIC 542, 543 Comparative and Historical Grammar of Turkic Languages (3, 3) Cirtautas Classification of the Turkic languages; alphabets used; phonology, morphology, and syntax; lexical composition; structure changing developments. Prerequisites: 404.

TKIC 546 Old Turkic (3) Cirtautas Introduction to Runic script; phonology, morphology, and syntax of the oldest form of Turkic; reading and translation of eighth-century inscriptions of historical and literary importance. Prerequisite: permission of instructor.

TKIC 547 Old Uighur (3) Cirtautas Introduction to script systems; phonology, morphology, and syntax. Reading and translation of mainly Buddhist texts in Uighur script, eighth through eleventh centuries. Prerequisite: background in a Turkic language or permission of instructor.

TKIC 561, 562 Middle Turkic (3, 3) Cirtautas Introduction to the phonology, morphology, and syntax of the Middle Turkic languages; reading and translation of texts in Karakhanid, Khorazmian Turkic, Kipchak, and Chagatai. Prerequisite: permission of instructor.

TKIC 563 Seminar on Turkic Literature (5) Cirtautas Topics in oral and written literature. Prerequisite: permission of instructor.

TKIC 600 Independent Study or Research (1-9)

Turkish

TKISH 600 Independent Study or Research (*)

Near Eastern Languages and Civilization

NEAR E 518 Foreign Language Teaching Methodology (2) Brandl Current foreign language teaching methods and approaches. Learning and teaching strategies and techniques for the four skills (reading, writing, speaking, listening) including cultural notions. Current and future trends in pedagogy and technology. Offered: jointly with ASIAN 518/GERMAN 518/SCAND 518/SLAV 518.

NEAR E 520 Seminar on Near Eastern Civilization and Thought (3, max. 27) Content varies.

NEAR E 521 Research Methods (3) Introduction to research in Islamic civilization. Research methods, primary sources, evidence and documentation, reference works, transliteration systems, scholarly writing style.

NEAR E 522 Islamic Theology (3) Various schools of Islamic theology.

NEAR E 523 Islamic Philosophy (3) Various topics and problems dealt with by the Islamic philosophers.

NEAR E 524 Islamic Law (3) Selected topics in Islamic law that highlight major aspects of Islamic civilization.

NEAR E 525 Islamic Institutions (3) Islamic institutions of the caliphate, the sultanate, the bureaucracy, taxation, mosques, and madrasahs, as well as theories of government.

NEAR E 530 Seminar on Near Eastern Literature (3, max. 27) Prerequisite: reading knowledge of at least one Near Eastern language. Content varies.

NEAR E 531 Proseminar in Literary Analysis (3, max. 9) Introduction to the theory and techniques of the study of literature in general and Near Eastern literatures in particular. Content varies. Prerequisite: reading knowledge of at least one Near Eastern language.

NEAR E 532 Theory and Practice in Modern Near Eastern Literature (3) Application of literary theory to works of modern Near Eastern literature. Concentrates on one major theory each year. Content varies.

NEAR E 533 Islamic Poetry and Poetics (3) Karimi-Hakkak Detailed introduction to prosody and rhyme in classical Arabic and Persian, followed by critical analysis of selected texts. Prerequisite: advanced level of Arabic or Persian; some knowledge of the other recommended.

NEAR E 596 Special Studies in Near Eastern Languages and Civilization (3-5, max. 15) Offered occasionally by visitors or resident faculty. Content varies.

NEAR E 600 Independent Study or Research (*)

Peace and Strategic Studies

9 Communications

The program in Peace and Strategic Studies enhances the student's understanding of the problem of war and also contributes to society's capacity for coping with this problem. Students have access to the experience of those working both with peace and conflict studies and with strategic studies. Offered as an option under General Studies, the program is intended to serve primarily as part of a double major with, for example, political science, psychology, or physics. See a General Studies adviser for requirements.

Philosophy

345 Savery

Philosophy is the study of the most fundamental issues concerning reality, knowledge, and value, and of the basic concepts, principles, and arguments of the major intellectual disciplines. Its fields include metaphysics, epistemology, logic, ethics, history of philosophy, political philosophy, aesthetics, philosophy of science, philosophy of mind, philosophy of language, philosophy of law, and philosophy of religion.

Undergraduate Program

Bachelor of Arts

Admission Requirements: There are no prerequisites to declaring a philosophy major.

Major Requirements: 50 credits in philosophy which must include: (1) at least 25 credits at the UW; (2) at least four courses at the 400 level or above, excluding transfer credits and PHIL 484, which normally cannot be used to satisfy this requirement; (3) PHIL 120 or an upper-division course in logic; and (4) PHIL 320 and 322 (or 400-level courses in the same areas; undergraduate adviser must approve substitutions).

Minor

Minor Requirements: 30 credits in philosophy to include PHIL 115 or 120 or an upper-division course in logic; at least 15 credits at the 300 level or above, excluding transfer credits and PHIL 484.

Graduate Program

Master of Arts, Doctor of Philosophy

The Department of Philosophy offers programs of study leading to the Master of Arts and Doctor of Philosophy degrees, the M.A. program option serving as the initial stage of the Ph.D. program.

The Master of Arts program option is a two-year nonthesis program which may be extended to three years depending on the outcome of the spring research papers. The student must take twelve courses in philosophy, satisfy a logic requirement, and, at the end of the second year, submit three research papers for evaluation by the graduate faculty of the department. The courses and the papers must satisfy a distribution requirement. The departmental evaluation of the student's papers and course work determines whether an M.A. degree is awarded and also whether admission to the Ph.D. program is granted. The Ph.D. program, which normally requires at least two years of study beyond the M.A., has three general requirements: (1) General Examination, (2) dissertation, and (3) Final Examination.

Doctor of Philosophy (Philosophy and Medical Ethics)

Students who have completed the Master of Arts in medical history and ethics or who have satisfied the written portion of the General Examination requirement for a Ph.D. in philosophy may be admitted to this program after submitting an application for review by the Interdisciplinary Program Committee. A sample of written work is required from both philosophy and medical history and ethics applicants. Following admission to the program, students from medical history and ethics are required to submit three research papers (in the areas of history of philosophy, metaphysics/epistemology, and ethics) for evaluation by the graduate faculty of the Department of Philosophy in fulfillment of the written portion of the General Examination. The ethics paper requirement will be waived if the

master's thesis of medical history and ethics students is judged by the committee to be an acceptable alternative. Additional requirements for all students include: completion of nine philosophy courses (satisfying a distribution requirement) and six specified medical history and ethics courses; an oral examination devoted at least in part to the student's dissertation proposal; a doctoral dissertation; and a final examination. The student's supervisory committee must include representatives from both the Department of Philosophy and the Department of Medical History and Ethics. The committee may also include individuals from other departments in the University and other schools.

Special Requirements

An undergraduate major in philosophy is recommended, although not required, for admission to the M.A. program. An applicant's philosophical potential is assessed primarily on the basis of a sample of his or her written work in philosophy and secondarily on the basis of his or her undergraduate record, Graduate Record Examination scores, and letters of recommendation. A reading knowledge of at least one foreign language is strongly recommended.

Financial Aid

A number of teaching assistantships are available each year to new graduate students. At present, fifteen students of a total enrollment of thirty-nine hold assistantships.

Correspondence and Information

Graduate Program Coordinator
345 Savery, Box 353350
Telephone: (206) 543-5855
Fax: (206) 685-8740

Faculty

Chair

John F. Boler

Professors

Boler, John F. * 1960; PhD, 1960, Harvard University; medieval philosophy.

BonJour, Laurence A. * 1977; PhD, 1969, Princeton University; epistemology, contemporary philosophy.

Coburn, Robert C. * 1971; PhD, 1958, Harvard University; metaphysics and ethics.

Cohen, S. Marc * 1973; PhD, 1967, Cornell University; ancient Greek philosophy, metaphysics, philosophy of mind.

Dietrichson, Paul * 1961, (Emeritus); PhD, 1955, Yale University; philosophy of religion, ethics, metaphysics.

Keyt, David * 1957; PhD, 1955, Cornell University; ancient philosophy and logic.

Marks, Charles * 1975; PhD, 1972, Cornell University; philosophy of mind, British empiricism and continental rationalism.

Potter, Karl H. * 1970; PhD, 1955, Harvard University; South Asia, Indian philosophy, epistemology.

Richman, Robert J. * 1961, (Emeritus); PhD, 1953, Harvard University; ethics, epistemology.

Associate Professors

Clatterbaugh, Kenneth C. * 1966; PhD, 1966, Indiana University; philosophy of science, modern philosophy, social philosophy.

Jecker, Nancy A. S. * 1982, (Adjunct); MA, 1982, Stanford University; MA, 1984, PhD, 1986, University of Washington; philosophical and ethical aspects of health care delivery and policy.

Mish'alani, James K. * 1963; PhD, 1961, Brown University; ethics, philosophical anthropology, contemporary continental philosophy.

Moore, Ronald M. * 1979; PhD, 1971, Columbia University; philosophy of law, esthetics.

Roberts, Jean Valerie * 1991; PhD, 1982, University of Pittsburgh; ancient Greek philosophy, history of ethics and political theory, feminist philosophy.

Assistant Professors

Talbott, William J. * 1989; PhD, 1976, Harvard University; epistemology, ethics, political philosophy, game theory, and decision theory.

Washington, Corey * 1991; PhD, 1993, Stanford University; philosophy of language, philosophy of mind.

Senior Lecturer

Baker, Ann Michelle 1981; MA, 1983, PhD, 1990, University of Washington; metaphysics, epistemology, philosophy of mind.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

PHIL 100 Introduction to Philosophy (5) I&S Coburn, Marks, Roberts Major philosophical questions relating to such matters as ethics, the existence of God, the foundations of knowledge, and the nature of reality. Problems studied and works read vary. Offered: AWWSpS.

PHIL 101 Philosophical Classics (5) I&S Coburn. Selected works of some of the major philosophers, such as Plato, Aristotle, Descartes, Hume, Kant. The philosophers studied vary.

PHIL 102 Contemporary Moral Problems (5) VLP/I&S BonJour, Roberts, Talbott, Washington Philosophical consideration of some of the main moral problems of modern society and civilization, such as abortion, euthanasia, war, sexual morality, governmental paternalism, reverse discrimination, and capital punishment. Topics vary.

PHIL 110 Introduction to Social and Political Philosophy (5) I&S Clatterbaugh, Coburn Examination of such ideals as liberty, distributive justice, democracy, peace, and human survival. Problems involved in achieving social change also considered. Content varies.

PHIL 114 Philosophical Issues in the Law (5) I&S Moore Analysis and critical assessment of various philosophical issues in law and legal reasoning. Material drawn from actual law cases, as well as writings by contemporary philosophers of law and lawyers. Topics include criminal responsibility, civil disobedience, abortion, reverse discrimination, enforcement of morals. Special legal or philosophical training not required.

PHIL 115 Practical Reasoning (5) I&S, QSR Introduction to logic emphasizing concepts and methods useful for practical analysis of arguments in everyday contexts. Meaning, syllogisms, logical diagrams, inductive and statistical inference, informal fallacies, argument structure, perhaps some beginning symbolic logic. A wide variety of examples, including logical puzzles, considered. Offered: AWWSpS.

PHIL 120 Introduction to Logic (5) I&S/NW, QSR Cohen, Keyt, Washington Elementary symbolic logic. The development, application, and theoretical properties of an artificial symbolic language designed to provide a clear representation of the logical structure of deductive arguments. Offered: AWWSpS.

PHIL 160 A Historical Introduction to the Philosophy of Science (5) I&S Clatterbaugh Study of how

scientific theories are justified and why they are accepted, using selected examples from the history of science.

PHIL 200 Types of Philosophy (3-5) I&S Coburn, Mish'alani Introductory philosophy. The content of the course is entirely at the discretion of the instructor.

PHIL 206 Philosophy of Feminism (5) I&S Philosophical analysis of the concepts and assumptions central to feminism. Theoretical positions within the feminist movement; view of the ideal society, goals and strategies of the movement, intersections of the sex-gender system with other systems of oppression. Offered: jointly with POL S 212/WOMEN 206.

PHIL 230 Philosophic Issues in World Affairs (3) I&S Coburn Moral problems that arise in connection with such topics as affluence, hunger, and overpopulation; global environmental degradation; war and weaponry; restructuring the international order.

PHIL 240 Introduction to Ethics (5) VLPA/I&S Roberts, Talbott Critical introduction to various philosophical views of the basis and presuppositions of morality and moral knowledge. Critical introduction to various types of normative ethical theory, including utilitarian deontological, and virtue theories.

PHIL 241 Topics in Ethics (5) VLPA/I&S Mish'alani Introduction to ethics through in-depth study of one or more selected topics (e.g., limits of moral community, moral education, conscience, shame and guilt, virtue and vice, purity, saintliness and heroism, friendship, veracity, manners and morals, freedom, rights, collective responsibility). Topics vary.

PHIL 267 Introduction to Philosophy of Religion (5) I&S Coburn, Mish'alani Consideration of the sources of religious ideas and practices, the main kinds of religious views and the problems they raise, and the different forms that spirituality can take. Issues concerning the relations of religion to science and morality also treated.

PHIL 320 Ancient Philosophy (5) I&S Cohen, Keyt, Roberts Survey of ancient Greek philosophy, beginning with the pre-Socratics and proceeding on through Plato to Aristotle.

PHIL 321 Medieval Philosophy (5) I&S Boler Development of main lines of philosophical thought in the Latin West from 400 to 1400, with emphasis on Augustine, Anselm, Abailard, Aquinas, and Ockham. Recommended: 320.

PHIL 322 Modern Philosophy (5) I&S BonJour, Clatterbaugh, Coburn Examination of metaphysical and epistemological problems from the works of Descartes, Spinoza, Leibniz, Locke, Berkeley, Hume, and Kant.

PHIL 325 Nineteenth-Century Philosophy (5) I&S Coburn Examination of post-Kantian thinkers through the end of the nineteenth century considering such major themes as idealism, romanticism, positivism, historicism, naturalism, existentialism, and pragmatism.

PHIL 327 American Philosophy (5) I&S Boler, Potter Study of several of the major American philosophers: Peirce, Royce, Dewey, William James, C. I. Lewis, Goodman, Quine. Recommended: at least one course in philosophy.

PHIL 330 History of Ancient Political Philosophy (4) I&S Keyt Political philosophy of fourth- and fifth-century Greece, especially the Sophists, Plato, and Aristotle, stressing the connection between the political philosophy and the underlying philosophical system of each philosopher. Recommended: at least one course in philosophy.

PHIL 331 History of Medieval Political Philosophy (4) I&S Boler Political philosophy in the Middle Ages, especially the major figures (Augustine, Aquinas, Ockham), with special emphasis on the setting of their political thought in the context of their general philosophical positions. Recommended: at least one course in philosophy.

ting of their political thought in the context of their general philosophical positions. Recommended: at least one course in philosophy.

PHIL 332 History of Modern Political Philosophy (5) I&S Clatterbaugh Examination of major political philosophies from the sixteenth century to the nineteenth century, with attention to the underlying philosophical methods and foundations.

PHIL 334 Philosophy of Marxism (3) I&S Clatterbaugh Philosophy of Marx and the Marxist tradition with attention to the philosophical method and foundation of Marxism.

PHIL 338 Philosophy of Human Rights (3) I&S Coburn Theories of human rights and the bearing of these theories on such issues of public policy as the legitimacy of war and terrorism, whether people have rights to a clean environment or a welfare floor, and whether future generations have rights.

PHIL 340 History of Ancient Ethics (5) VLPA/I&S Keyt, Roberts Development of moral thought from Socrates through the Stoics. Particular emphasis on the ethical writings of Plato and Aristotle. Recommended: one course in philosophy.

PHIL 342 History of Modern Ethics (5) VLPA/I&S Development of moral thought from Hobbes through Nietzsche, with particular emphasis on the ethical writings of Hume, Kant, and John Stuart Mill. Recommended: one course in philosophy.

PHIL 344 History of Recent Ethics (5) VLPA/I&S Study of major ethical writings in the twentieth century, with principal emphasis on the Anglo-American tradition. Recommended: one course in philosophy.

PHIL 345 Moral Issues of Life and Death (5) VLPA/I&S Coburn Examination of such topics as war and murder, famine relief, capital punishment, high-risk technologies, abortion, suicide, and the rights of future generations. Prerequisite: one course in philosophy or junior standing.

PHIL 346 Personal Values and Human Good (3) I&S Coburn Examination of the ideas of a good human life. Emphases differ from year to year. Typical topics include happiness and prudence, rationality and life plans, personal values and the meaning of life, autonomy and false consciousness, self-respect and self-esteem, honesty and self-deception, faith and "vital lies." Prerequisites: two previous courses in philosophy.

PHIL 347 Philosophy in Literature (5) VLPA/I&S Marks, Mish'alani Study of philosophical ideas expressed in works of literature.

PHIL 350 Introduction to Epistemology (4) I&S BonJour, Talbott Theory of knowledge. Nature, definition, and possibility of knowledge. Problems about our knowledge of the external world, the past, other minds, mathematics. Prerequisites: two previous courses in philosophy.

PHIL 353 Introduction to the Philosophy of Language (5) I&S Washington Philosophical theories about the nature of language. Topics include meaning, reference, truth, propositions, relations between language and thought and between language and logic, relation of philosophy of language to linguistics and psychology. Recommended: 120.

PHIL 363 Introduction to the Philosophy of Mind (5) I&S Marks, Washington Various theories of the nature of mind, the relationship between mind and body, the self, memory, the unconscious, introspection, and knowledge of other minds. Recommended: one course in philosophy.

PHIL 372 Introduction to Set Theory (5) I&S Historical development and basic concepts of set theory. Set theoretical paradoxes and their proposed solutions.

PHIL 386 Introduction to the Philosophical Systems of India (5) I&S Potter The fundamental views of classical Indian philosophical schools on epistemology and metaphysics through readings in translation of basic works. Nyaya, Vaisheshika, Samkhya, Yoga, Jain philosophy, Vijnanavada and Madhyamika Buddhism, Advaita Vedanta and later developments. Prerequisite: SISSA 210 or one course in philosophy. Offered: jointly with SISSA 386.

PHIL 406 Philosophical Topics in Feminism (5) I&S Roberts Detailed examination of questions raised by recent feminist scholarship in particular areas of philosophy, such as political theory, ethics, epistemology, or philosophy of science. Emphasis varies.

PHIL 410 Social Philosophy (5) I&S Coburn, Talbott Examination of social ideals such as liberty and justice, and of social problems associated with current and prospective technological developments. Emphases vary each year.

PHIL 411 Justice in Health Care (5) VLPA/I&S Jecker Examination of the ethical problem of allocating scarce medical resources. Emphasis on fundamental principles of justice that support alternative health policies. Recommended: some previous background in philosophy or medical ethics. Offered: jointly with MHE 474.

PHIL 412 Indian Philosophy (5) I&S Potter Historical survey of the major systems and the traditional problems of philosophy in India. Readings in Buddhism, Nyaya, Samkhya, and Vedanta. Recommended: 100 or 386.

PHIL 413 Studies in Indian Philosophy (3, max. 9) I&S Potter One or more individual figures or problems in Indian philosophy selected by the instructor. Prerequisite: 412.

PHIL 414 Philosophy of Law (3) I&S BonJour, Moore Nature and function of law. Relation of law to morality. Legal rights, judicial reasoning. Recommended: 110 or 114 or 240.

PHIL 418 Indian Buddhist Philosophy (3) I&S Topics from Buddhist thought, both Sravakayanist and Mahayanist, touching on the following areas: epistemology, theory of liberation, metaphysics and the theory of the absolute, cosmology, and ethics. Readings in translation. At least one course in Indian philosophy or Hinduism or Buddhism recommended.

PHIL 421 Studies in Medieval Philosophy (3, max. 9) I&S Boler Detailed study of an individual figure or problem in medieval philosophy (of the Latin West) selected by the instructor. Recommended: 321.

PHIL 422 Studies in Continental Rationalism (3, max. 9) I&S Clatterbaugh, Coburn, Marks Study of one or more of the major continental Rationalists: Descartes, Spinoza, Leibniz. Recommended: 322.

PHIL 426 Twentieth-Century Philosophy (5) I&S Birth and development of contemporary analytic philosophy, the revolt against idealism and the linguistic turn in philosophy. Topics and authors include: common sense philosophy and the rejection of British idealism; Frege's conceptual notation and the analysis of language; logical positivism; the logical atomism of Russell and Wittgenstein.

PHIL 430 Hellenistic Philosophy (3) I&S Survey of the Epicurean, Stoic, and Sceptic philosophy of the Hellenistic period. Emphasis varies.

PHIL 431 Philosophy of Plato (3, max. 6) I&S Cohen, Keyt, Roberts Study of selected middle and late dialogues. Recommended: 320.

PHIL 433 Philosophy of Aristotle (3, max. 6) I&S Cohen, Keyt, Roberts Study of several major Aristotelian treatises. Recommended: 320.

PHIL 434 Philosophy of Thomas Aquinas (3) I&S *Boier* Examination of the major philosophical positions of Thomas Aquinas in the theory of knowledge, metaphysics, and ethics. Recommended: 321.

PHIL 436 British Empiricism (3) I&S *BonJour, Marks* Examination of the metaphysical and epistemological views of Locke and Berkeley, with perhaps some attention also to Hume. Recommended: 322.

PHIL 437 Philosophy of Hume (3) I&S *Marks* Study of the principles and methods employed by Hume in his analyses of knowledge, the passions, and morals. Recommended: 322.

PHIL 438 Philosophy of Kant (5) I&S *BonJour* Systematic study of The Critique of Pure Reason or of one or more other major works of Kant. Recommended: one course in philosophy (other than logic) beyond the introductory level.

PHIL 439 The Later Philosophy of Wittgenstein (3) I&S *Coburn* Detailed study of topics in the later philosophy of Wittgenstein, with particular attention to the Philosophical Investigations. Recommended: 322.

PHIL 440 Ethics (3) I&S *Coburn, Roberts, Talbott* Critical examination of the concepts and judgments of value, including an analytical treatment of the notions of good and bad, right and wrong, and obligation. Emphasis varies from quarter to quarter. Recommended: 240.

PHIL 443 Philosophy and Linguistics (3) VLP&I&S *Washington* Study of philosophical problems that arise in the attempt to understand current linguistic theories and of the implications of linguistics for philosophy. Offered: jointly with LING 443.

PHIL 444 Philosophy of Language—Pragmatics (3) VLP&I&S *Potter, Washington* Language as communicative activity. Speech act theory in Austin, Grice, and contemporary writings. Applications to problems of reference, presupposition, metaphor, relativism. Offered: jointly with LING 444.

PHIL 445 Philosophy of Art (5) VLP&I&S *Moore* Critical examination of various accounts of the nature of art, artistic activity, the aesthetic experience. Problems in interpretation and evaluation of works of art.

PHIL 446 Development of Aesthetic Theory (5) VLP&I&S *Moore* Historical development of aesthetics, emphasizing such major figures as Plato, Aristotle, Hume, Kant, Hegel, and Goodman. Recommended: 100 or 445.

PHIL 447 Philosophy of Literature (3) VLP&I&S *Mish'alani* Investigation of philosophical questions about literature: What is literature? Why write? Must literature be interpreted? What is interpretation? Literature and ideology; criticism of literature and society.

PHIL 450 Epistemology (5) I&S *BonJour, Talbott* Systematic study of some of the main problems of the theory of knowledge, such as: the definition of "knowledge"; a priori knowledge; perception and knowledge of the external world; memory knowledge; theoretical knowledge; knowledge of other minds; and whether knowledge has or requires a foundation. Emphasis varies from quarter to quarter. Recommended: 350 or 322.

PHIL 453 Philosophy of Language (5) VLP&I&S *Washington* Current theories of meaning, reference, predication, and related concepts. Recommended: 120. Offered: jointly with LING 476.

PHIL 456 Metaphysics (5) I&S *Coburn* Examination of issues and problems that arise in connection with such topics as freedom of the will, the nature of persons and personal identity, the existence of God, time, necessary truth, and universals. The emphases vary from year to year. Recommended: 120 and 322 or equivalents.

PHIL 458 Phenomenology (5) I&S *Mish'alani* The contribution of phenomenology to selected topics in the theory of meaning, philosophy of mind, ontology, and epistemology.

PHIL 459 Philosophy of Medicine (5) I&S *Jecker* Familiarizes students with central issues in the philosophy of medicine. Focuses on the nature of medical knowledge, the connection between theory and observation, the meaning of medical concepts, and the relationship between theories and the world. Prerequisites: some prior course work in philosophy, the history of science, or the history of medicine. Offered: jointly with MHE 440.

PHIL 460 Philosophy of Science (5) I&S/NW *BonJour, Clatterbaugh* Critical study of different theories about the nature of scientific theory. Topics include the relation of theory to observation, the use of mathematics, how theories change, the requirements for the meaningfulness of a theory, and the relation between theory and methodology.

PHIL 461 Philosophical Anthropology (5) I&S *Mish'alani* Investigation of the question, "What is human reality?" Philosophical significance of this question and its relation to the human sciences. Typical answers. Implications of those answers for culture, religion, morals, and politics. Recommended: 100, 206, 240, or 410.

PHIL 463 Philosophy of Mind (3) I&S *Marks, Washington* Examination of current theories of the nature of the mind and mental processes. Recommended: 363 or permission of instructor.

PHIL 464 Philosophical Issues in the Cognitive Sciences (5) I&S/NW *Marks, Washington* Philosophical problems connected with research in psychology, artificial intelligence, and other cognitive sciences. Topics vary. Readings from both philosophical and scientific literature. Accessible to nonphilosophers with suitable interests and backgrounds.

PHIL 465 Philosophy of History (3) I&S *Mish'alani* Analyses of basic concepts employed in historical interpretation, and study of some of the principal philosophers of history, such as Plato, Saint Augustine, Hegel, Marx, Spengler, Toynbee.

PHIL 466 Philosophy of the Social Sciences (5) I&S *Talbott* Examination of fundamental issues in the foundations, methodology, and interpretation of the social sciences. Topics include value orientation and objectivity, methodological individualism, functionalism, reductionism, and the status of idealized models, including models involving idealized conceptions of individual rationality. Emphasis varies from quarter to quarter. Recommended: 120 or 160 or 460.

PHIL 467 Philosophy of Religion (5) I&S *BonJour* Study of selected topics and problems in the philosophy of religion, such as: arguments for the existence of God; the problem of evil; atheism; faith; religious experience and revelation; the attributes of God; miracles; immortality; and the relation between religion and morality. Readings from historical and contemporary authors. Recommended: one course in philosophy, other than logic, beyond the introductory level.

PHIL 469 Existentialist Philosophy (3) I&S *Mish'alani* Critical examination of major ideas in Kierkegaard's philosophy and in Sartre's or Heidegger's philosophy. Recommended: one course in philosophy, other than logic, beyond the introductory level.

PHIL 470 Intermediate Logic (5) I&S/NW, QSR *Keyl* An introduction to the concepts and methods of metatheory and their application to the sentential calculus. Recommended: 120.

PHIL 471 Advanced Logic (5) I&S/NW *Keyl* Study of the first-order predicate calculus with identity and function symbols. Consistency, soundness, completeness, compactness. Skolem-Löwenheim theo-

rem, Formalized theories. Recommended: 470 or permission of instructor.

PHIL 472 Axiomatic Set Theory (5) I&S/NW Development of axiomatic set theory up to and including the consistency of the Axiom of Choice and Continuum Hypothesis with the Zermelo-Fraenkel Axioms. Recommended: 470 or permission of instructor.

PHIL 473 Philosophy of Mathematics (5) I&S/NW Traditional accounts of the nature of mathematical entities and mathematical truth given by logicism, intuitionism, and formalism, and the impact of Gödel's incompleteness theorems on these accounts. Recommended: some background in mathematics and formal logic.

PHIL 474 Modal Logic (5) I&S/NW Notions of necessity and possibility, using the classical systems T, S4, and S5, and the syntax and the semantics (Kripke models) of these systems. Recommended: 470.

PHIL 479 Formal Semantics and Natural Language (3) VLP&I&S *Washington* Introduction to formal characterization of linguistic meaning. Emphasis on nature and purpose of formal semantics and its relation to formal syntax. Typical topics: Tarskian definitions of truth; "truth theory" and theory of meaning; possible world semantics; Montague semantics; generative semantics; Chomsky on syntax and semantics. Recommended: 120 or 470. Offered: jointly with LING 479.

PHIL 484 Reading in Philosophy (1-5, max. 15) Reading of approved philosophical works. Prerequisite: permission of instructor.

Courses for Graduates Only

PHIL 500 Proseminar in Philosophy (5) Development of oral skills in the presentation, criticism, and discussion of philosophical problems and arguments. Student presentations and responses to criticism on a variety of basic philosophical issues. Credit/no credit only.

PHIL 510 Seminar in Social Philosophy (5) Topics vary. Generally offers either an in-depth examination of the writings of a particular social philosopher or an examination of some contemporary problem in social philosophy. Prerequisite: 410 or equivalent.

PHIL 514 Seminar in Legal Philosophy (5, max. 20) *Moore*

PHIL 520 Seminar in Ancient Philosophy (5, max. 20) *Cohen, Keyl, Roberts*

PHIL 521 Seminar in Medieval Philosophy (5, max. 20) *Boier*

PHIL 522 Seminar in Modern Philosophy (5, max. 20) *Clatterbaugh*

PHIL 525 Seminar in Nineteenth-Century Philosophy (5, max. 20) *Mish'alani*

PHIL 526 Seminar in Recent Philosophy (5, max. 20) *Keyl, Mish'alani*

PHIL 540 Seminar in Ethics (5, max. 20) *Coburn, Keyl, Roberts, Talbott*

PHIL 545 Seminar in the Philosophy of Art (5, max. 20) *Moore*

PHIL 550 Seminar in Epistemology (5, max. 20) *BonJour, Talbott*

PHIL 553 Seminar in Philosophy of Language (5, max. 20) *Washington* Topics may vary, but emphasis on contemporary research in field. Sample topics: truth; intensionality and actuality; treatments of quantification; semantics for psychological verbs.

PHIL 556 Seminar in Metaphysics (5, max. 20) *BonJour, Coburn*

PHIL 560 Seminar in the Philosophy of Science (5, max. 20) *BonJour, Clatterbaugh*

PHIL 563 Seminar in the Philosophy of Mind (5, max. 20) *Marks, Washington*

PHIL 565 Seminar in the Philosophy of History (5, max. 20) *Mish'alani*

PHIL 566 Seminar in Philosophy of the Social Sciences (5)

PHIL 567 Seminar in the Philosophy of Religion (5, max. 20) *Coburn*

PHIL 570 Seminar in Logic (5, max. 20) *Key*

PHIL 584 Reading in Philosophy (1-5, max. 12) Intensive reading in philosophical literature. Prerequisite: permission of graduate program coordinator.

PHIL 586 Seminar in Indian Philosophy (5, max. 20) *Potter* Prerequisite: 412.

PHIL 587 Contemporary Analytic Philosophy (5, max. 20)

PHIL 600 Independent Study or Research (*) Prerequisite: permission of graduate program coordinator.

PHIL 700 Master's Thesis (*)

PHIL 800 Doctoral Dissertation (*)

Physics

C121 Physics-Astronomy

Physics is the study of the fundamental structure of matter and the interaction of its constituents, with the goal of providing a quantitative description of nature based on a limited number of physical principles.

Undergraduate Program

Bachelor of Science

Admission Requirements: Recommended preparation includes four years of college preparatory mathematics, one year of physics, and one year of chemistry.

Major Requirements: (1) Core courses—PHYS 121/131, 122/132, 123/133, 224, 225, 227, 228, 321, 322, 334, 335; (2) 3 credits selected from upper-division lecture courses in modern physics; (3) 3 credits selected from upper-division physics laboratory courses; (4) 3 credits in PHYS 491, 492, 493 or 494, 495, 496; (5) 5 credits selected from approved upper-division physics courses or approved courses in cognate subjects; (6) MATH 124, 125, 126, 307, 324 or MATH 134, 135, 136, 334, 335, 336; (7) 9 credits selected from physical or biological sciences other than physics or mathematics, or from the history or philosophy of science, in addition to any courses in these fields taken to satisfy requirement (5); (8) at least 12 credits of the physics courses presented to satisfy requirements (1) through (5) shall be in physics courses numbered 300 or above taken at the UW. Grades of 2.0 or better are required in all courses presented in fulfillment of requirements (1) through (5). Students who plan graduate study in physics are strongly advised to complete, in addition to courses listed in requirement (1), the following: PHYS 323, 324, 325, 328, 331, 421, 422, 423, 424, 425, 426, 431, 432, 433, and AMATH 401, 402, 403.

Progress Requirement: In each academic year, every undergraduate physics major who either has completed the required 200-level courses in physics or has begun physics courses beyond the 200 level must (1) complete at least 15 credits of course work acceptable in fulfillment of the departmental degree requirements

exclusive of credits earned by repeating courses in which acceptable credit has been earned previously, or (2) complete satisfactorily an approved part-time program of study. Students who do not satisfy the above requirement will be dropped as physics majors unless exempted explicitly by the Physics Undergraduate Committee. Students dropped for this reason may petition the committee for readmission to the major.

Graduate Program

The Department of Physics offers studies leading to the degrees of Master of Science and Doctor of Philosophy. The department has a permanent faculty of 45 members, about 25 research faculty, and about 40 adjunct, affiliate, and emeritus faculty. An average of 13 Ph.D. and 25 M.S. degrees in physics have been awarded annually in recent years.

Research Facilities

The department is well equipped, both in staff and facilities, for instruction and research in a discipline that emphasizes fundamental problems in the understanding of the physical universe. Areas of research available to the Ph.D. student within the department include atomic physics, astrophysics, condensed-matter physics, elementary-particle physics, nuclear physics, and physics education. In addition, students may do research in physics with adjunct faculty members whose primary appointment is in another department such as Geophysics, Chemistry, or Electrical Engineering. Experimental work in atomic physics is concentrated on the measurement of fundamental properties of atomic particles through laser, electromagnetic trap, and radiofrequency techniques. The emphasis on fundamental measurements is continued in experiments on the gravitational force, carried out by faculty and students in atomic, nuclear, and astrophysics. Condensed-matter research is concentrated on the study of surfaces and interfaces, but includes materials as varied as high-temperature superconductors and ice. Synchrotron radiation from facilities at the Stanford Linear Accelerator Center, the Brookhaven National Laboratory, and the Advanced Photon Light Source under construction at Argonne National Laboratory, as well as local X-ray generators, are used to study solids and surfaces. The properties of matter at very high pressures and low temperatures are investigated on campus. Members of high-energy experimental groups are heavily engaged in experiments with accelerators at the Brookhaven National Laboratory, the European Center for Nuclear Research, the Fermi National Laboratory, and the Stanford Linear Accelerator Center. Faculty and students of the nuclear physics group use the on-campus accelerators of the Nuclear Physics Laboratory (NPL), as well as major facilities in the U.S., Canada, and Europe. The on-campus NPL facility provides beams of light and heavy ions with an 11 megavolt tandem accelerator injecting a superconducting linac. On the theoretical side, members of the department are concerned with problems in the theories of elementary particles and quantum fields, nuclear and high-energy reactions, phase transitions and statistical mechanics; condensed-matter physics from localization in disordered systems to electron transport in mesoscopic systems, atomic physics, general relativity, and astrophysics. The Institute for Nuclear Theory, a Department of Energy-funded national facility, is closely associated with the department and offers a unique opportunity for students to pursue research with distinguished permanent and visiting staff. Students in physics have the opportunity to obtain a physics degree in selected interdisciplinary and applied physics areas through research with faculty members in other departments.

Department facilities are housed in the new Physics-Astronomy Building and the Nuclear Physics Laboratory.

Master of Science (Applications of Physics)

Admission Requirements: This option is designed for students who are currently employed and whose backgrounds are in physical science, engineering, or mathematics. Admission is based on course grades in physics and related fields, adequacy of preparation in physics, and interest in areas of specialization offered in the physics department.

Graduation Requirements: In addition to the standard Graduate School requirements, students are expected to complete the sequence of core courses PHYS 441, 541, and 543 and to select appropriate specialized courses. Students are expected to undertake an independent study project in consultation with a faculty member. This project may be carried out at the University or at the student's place of employment. A written report as well as an oral presentation of the project is required. Students must take at least 3 credits of PHYS 600 and at least 12 credits in other physics graduate courses. No thesis is required.

Master of Science, Doctor of Philosophy

Admission Requirements: Undergraduate preparation to include upper-division courses in mechanics; electricity and magnetism; statistical physics and thermodynamics; modern physics, including an introduction to quantum mechanics; and advanced laboratory work. Preparation in mathematics to include vector analysis, complex variables, ordinary differential equations, Fourier analysis, boundary-value problems, and special functions. Admissibility is determined by the applicant's undergraduate program, undergraduate grades, Graduate Record Examination aptitude and advanced physics scores, letters of recommendation, and a statement of educational and professional objectives.

Master of Science

Graduation Requirements: Department requirements include standard Graduate School requirements. In addition, 3 credits must be in PHYS 600 and at least 12 other credits in physics graduate courses. A final examination is required. No thesis is required.

Doctor of Philosophy

Graduation Requirements: The student is expected to obtain here, or elsewhere with a master's degree, a background in physics equivalent to that contained in the following sequences of basic graduate courses: PHYS 505, 506, 513, 514, 515, 517, 518, 519, 520, 521, and 524; and in specialized courses appropriate to each student's interests. The student is required to pass, successively, a written qualifying examination (in the autumn of the second year), an oral General Examination for admission to candidacy, and an oral Final Examination. In order to take the General Examination, the student must have been accepted by a graduate faculty member as a research student and have completed the graduate studies outlined above. This examination covers the area in which the dissertation research is planned. Teaching experience is required of all candidates. Students holding Teaching Assistantships are required to take PHYS 501-503, courses in teaching techniques in physics.

Financial Aid

Most graduate students are supported by fellowships and assistantships. Application for these should be made along with the application for admission.

Faculty

Chair

Stephen D. Ellis

Professors

- Adelberger, Eric G. * 1972; PhD, 1967, California Institute of Technology; experimental nuclear physics.
- Alberg, Mary Ann 1974, (Affiliate); PhD, 1974, University of Washington; theoretical nuclear physics.
- Arons, Arnold B. 1968, (Emeritus); MS, 1940, Stevens Institute of Technology; PhD, 1943, Harvard University; physical oceanography, physics education.
- Baker, Marcia * 1980, (Adjunct); MS, 1960, Stanford University; PhD, 1971, University of Washington; cloud physics, atmospheric geophysics.
- Baker, Marshall * 1962; PhD, 1958, Harvard University; field theory, theoretical elementary-particle physics.
- Bardeen, James M. * 1976; PhD, 1965, California Institute of Technology; general relativity, theoretical astrophysics.
- Bertsch, George F. * 1992; PhD, 1965, Princeton University; theoretical physics, nuclear and atomic cluster physics.
- Bichsel, Hans 1992, (Affiliate); PhD, 1951, University of Basel (Switzerland); experimental nuclear physics.
- Bodansky, David * 1954, (Emeritus); PhD, 1950, Harvard University; experimental nuclear physics.
- Boulware, David G. * 1965; PhD, 1962, Harvard University; field theory, theoretical elementary-particle physics, general relativity.
- Bowles, Thomas J. 1995, (Affiliate); PhD, 1978, Princeton University; experimental nuclear physics.
- Boynton, Paul * 1970; PhD, 1967, Princeton University; high-energy astrophysics, astronomy.
- Brown, Frederick C. * 1987; PhD, 1950, Harvard University; use of synchrotron radiation in experimental solid state physics.
- Brown, Lowell S. * 1968; PhD, 1961, Harvard University; field theory, theoretical elementary-particle physics.
- Burnett, Thompson H. * 1979; PhD, 1968, University of California (San Diego); experimental elementary-particle physics.
- Cahn, John Werner 1984, (Affiliate); PhD, 1953, University of California (Berkeley); theoretical condensed-matter physics.
- Campbell, Charles T. * 1989, (Adjunct); PhD, 1979, University of Texas (Austin); physical chemistry of solid surfaces, chemisorption, catalysis, and surface analysis.
- Chaloupka, Vladimir * 1981; PhD, 1975, University of Geneva (Switzerland); experimental elementary-particle physics.
- Clark, Kenneth C. * 1948, (Emeritus); PhD, 1947, Harvard University; optical spectroscopy, upper atmosphere.
- Cook, Victor * 1963; PhD, 1962, University of California (Berkeley); experimental high-energy physics.
- Cramer, John G. * 1964; PhD, 1961, Rice University; experimental nuclear physics.
- Dash, J. Gregory * 1961, (Emeritus); PhD, 1951, Columbia University; low-temperature condensed-matter physics.
- Dehmelt, Hans G. * 1955; PhD, 1950, University of Göttingen (Germany); experimental atomic physics.
- Den Nijs, Marcel P. * 1981; PhD, 1979, Katholieke University (Netherlands); theoretical condensed-matter physics.
- Doe, Peter J. 1994, (Research); MSc, 1974, PhD, 1977, University of Durham (UK); experimental nuclear physics.
- Drobny, Gary P. * 1981, (Adjunct); PhD, 1981, University of California (Berkeley); two-dimensional and multiple quantum studies in nuclear magnetic resonance.
- Efimov, Vitaly 1990, (Affiliate); PhD, 1966, Physico-Technical Institute (USSR); theoretical nuclear physics.
- Ellis, Stephen D. * 1975; PhD, 1971, California Institute of Technology; theoretical elementary-particle physics.
- Engel, Thomas * 1980, (Adjunct); PhD, 1969, University of Chicago; surface chemistry and catalysis.
- Fain, Samuel C. * 1970; PhD, 1969, University of Illinois; experimental condensed-matter physics, surface physics.
- Farwell, George W. * 1948, (Emeritus); PhD, 1948, University of Chicago; experimental nuclear physics.
- Fortson, E. Norval * 1963; PhD, 1964, Harvard University; experimental atomic physics.
- Geballe, Ronald * 1946, (Emeritus); PhD, 1943, University of California (Berkeley); atomic and molecular collisions, physics education.
- Gerhart, James B. * 1956; PhD, 1954, Princeton University; physics education.
- Halpern, Isaac * 1953, (Emeritus); PhD, 1948, Massachusetts Institute of Technology; experimental nuclear physics.
- Haxton, Wick C. * 1984; PhD, 1976, Stanford University; theoretical physics, nuclear physics.
- Heckel, Blayne * 1983; PhD, 1981, Harvard University; experimental neutron and atomic physics.
- Hein, Robert A. 1990, (Affiliate); PhD, 1967, Catholic University of America; theoretical condensed-matter physics.
- Henley, Ernest M. * 1954, (Emeritus); PhD, 1952, University of California (Berkeley); theoretical nuclear physics, theoretical elementary-particle physics.
- Henyey, Frank S. * 1991, (Affiliate); PhD, 1967, California Institute of Technology; theoretical ocean hydrodynamics and theoretical ocean acoustics.
- Hogan, Craig J. * 1990; PhD, 1980, Cambridge University (UK); astrophysical cosmology, especially the origin of astronomical structures in the expanding universe.
- Holzworth, Robert * 1982, (Adjunct); PhD, 1977, University of California (Berkeley); experimental space plasma physics, atmospheric/magnetospheric electric fields, thunderstorms.
- Ingalls, Robert L. * 1966; PhD, 1962, Carnegie-Mellon University; experimental condensed-matter physics.
- Jarboe, Thomas R. * 1989, (Adjunct); PhD, 1974, University of California (Berkeley); plasma physics and controlled fusion, magnetic reconnection and relaxation.
- Lake, George Russell * 1985, (Adjunct); PhD, 1980, Princeton University; stellar dynamics, galaxy structure and formation, cosmology, computational astrophysics.
- Lord, Jere J. * 1952, (Emeritus); PhD, 1950, University of Chicago; cosmic rays, experimental elementary-particle physics.
- Lubatti, Henry J. * 1969; PhD, 1966, University of California (Berkeley); experimental elementary-particle physics.
- Margon, Bruce H. * 1980, (Adjunct); PhD, 1973, University of California (Berkeley); galactic and extragalactic x-ray astronomy, optical counterparts of x-ray sources.
- McDermott, Lillian C. * 1971; PhD, 1959, Columbia University; physics education.
- McDermott, Mark N. * 1962; PhD, 1959, Columbia University; experimental atomic physics.
- Miller, Gerald * 1975; PhD, 1972, Massachusetts Institute of Technology; theoretical nuclear physics.
- Mockett, Paul M. * 1972, (Research); PhD, 1965, Massachusetts Institute of Technology; experimental elementary-particle physics.
- Odyniec, Grazyna 1994, (Affiliate); PhD, 1978, University of Warsaw (Poland); experimental nuclear physics.
- Parks, George K. * 1971, (Adjunct); PhD, 1966, University of California (Berkeley); particles and waves in auroral, magnetospheric, and interplanetary space plasma phenomena.
- Pearsall, Thomas P. * 1989, (Adjunct); PhD, 1973, Cornell University; physics of semiconductors and the technology of semiconductor devices.
- Puff, Robert D. * 1962; PhD, 1960, Harvard University; many-body theory, statistical physics.
- Rehr, John J. * 1974; PhD, 1972, Cornell University; theoretical condensed-matter physics.
- Riedel, Eberhard K. * 1975, (Affiliate); PhD, 1966, Technical University of Munich (Germany); theoretical condensed-matter physics.
- Robertson, R. G. Hamish * 1994; MA, 1965, Oxford University (UK); PhD, 1971, McMaster University (Canada); experimental nuclear physics.
- Rothberg, Joseph E. * 1969; PhD, 1963, Columbia University; experimental high-energy physics.
- Schick, Michael * 1969; PhD, 1967, Stanford University; theoretical condensed-matter physics.
- Sharpe, Stephen R. * 1986; PhD, 1983, University of California (Berkeley); theoretical particle physics: lattice gauge theory and strong interaction phenomenology.
- Snover, Kurt Albert * 1972, (Research); PhD, 1969, Stanford University; experimental nuclear physics.
- Sorensen, Larry B. * 1983; PhD, 1980, University of Illinois; experimental condensed-matter physics.
- Spivak, Boris * 1991; PhD, 1970, Leningrad Polytech Institute (Russia); theoretical condensed-matter physics.
- Stern, Edward A. * 1965; PhD, 1955, California Institute of Technology; experimental condensed-matter physics.
- Storm, Derek * 1979, (Research); PhD, 1970, University of Washington; nuclear physics, especially medium energy, accelerator physics.
- Streib, John F. * 1947, (Emeritus); PhD, 1941, California Institute of Technology; experimental nuclear physics.
- Thouless, David * 1980; PhD, 1958, Cornell University; theoretical condensed-matter physics.
- Van Dyck, Robert S. Jr. * 1971; PhD, 1971, University of California (Berkeley); experimental atomic physics.
- Vandenbosch, Robert * 1963, (Adjunct); PhD, 1957, University of California (Berkeley); nuclear fission and nuclear reaction mechanisms, atomic and molecular clusters, C_{60} .
- Vilches, Oscar E. * 1968; PhD, 1966, National University of Cuyo (Argentina); low-temperature condensed-matter physics.
- Weitkamp, William G. * 1987, (Emeritus); PhD, 1965, University of Wisconsin; experimental nuclear physics.
- Wilets, Lawrence * 1958, (Emeritus); PhD, 1952, Princeton University; theoretical nuclear and atomic physics.
- Wilkerson, John F. * 1994; MS, 1979, PhD, 1982, University of North Carolina; experimental nuclear physics.
- Wilkes, Richard Jeffrey * 1974, (Research); PhD, 1974, University of Wisconsin; experimental cosmic ray and elementary particle physics.

Williams, Robert W. * 1959, (Emeritus); PhD, 1948, Massachusetts Institute of Technology; experimental high-energy physics, cosmic rays.

Yaffe, Laurence G. * 1988; PhD, 1980, Princeton University; quantum field theory, elementary particle theory.

Young, Kenneth Kong * 1967; PhD, 1965, University of Pennsylvania; experimental high-energy physics.

Associate Professors

Jay, David A. * 1983, (Adjunct Research); PhD, 1987, University of Washington; wave processes, sediment transport and physical oceanography of coastal waters.

Jonsson, Hannes * 1988, (Adjunct); PhD, 1985, University of California (San Diego); computer simulations and scattering calculation in materials and surface science.

Kaplan, David B. * 1994; PhD, 1985, Harvard University; theoretical nuclear and elementary-particle physics.

Lamoreaux, Steve K. 1991, (Research); PhD, 1986, University of Washington; experimental atomic physics.

Nagourney, Warren * 1977, (Research); PhD, 1972, Columbia University; experimental atomic physics, high resolution laser spectroscopy of atoms.

Nelson, Ann E. * 1994; MA, 1981, PhD, 1984, Harvard University; theoretical elementary-particle physics.

Oberem, Graham E. * 1990, (Research); PhD, 1987, University of Rhodesia; physics education.

Olmstead, Marjorie A. * 1991; PhD, 1985, University of California (Berkeley); experimental condensed-matter physics, surface and interface physics.

Schwinberg, Paul B. 1991, (Research); PhD, 1979, University of Washington; experimental atomic physics.

Stubbs, Christopher 1994; PhD, 1988, MSc, 1988, University of Washington.

Trainor, Thomas A. * 1973, (Research); PhD, 1973, University of North Carolina; experimental nuclear physics.

Zhao, Tianchi 1990, (Research); PhD, 1987, Columbia University; experimental high-energy physics.

Assistant Professors

Arnold, Peter B. 1992, (Research); PhD, 1986, Stanford University; theoretical elementary-particle physics.

Bulgac, Aurel * 1993; PhD, 1977, Leningrad Nuclear Physics Institute; many body theory, molecular dynamics, classical and quantum chaos.

De Braeckeleer, Ludwig 1990, (Research); PhD, 1989, Catholic University of Louvain (Belgium); experimental nuclear physics.

Elliott, Steven R. 1995, (Research); PhD, 1987, University of California (Irvine); experimental nuclear physics.

Gundlach, Jens 1990, (Research); PhD, 1990, University of Washington; experimental nuclear physics.

Lestone, John P. 1994, (Research); PhD, 1991, Australian National University; experimental nuclear physics.

Ma, Yanjun 1988, (Research); PhD, 1987, University of Washington; experimental condensed-matter physics.

Mittleman, Richard K. 1987, (Research); PhD, 1987, University of Chicago; experimental atomic physics.

Shaffer, Peter S. 1993, (Research); PhD, 1993, University of Washington; physics education.

Vogel, Viola * 1990, (Adjunct); PhD, 1987, Johann Wolfgang Goethe University (Germany); molecular assemblies and Langmuir-Blodgett films, liquid interfaces, non-linear optics, microscopy.

Vokos, Stamatios P. 1992, (Research); PhD, 1990, University of California (Berkeley); physics education.

Wasserbaech, Steven R. * 1993, (Research); PhD, 1989, Stanford University; experimental high-energy physics.

Wettlaufer, John S. 1995, (Affiliate); PhD, 1991, University of Washington; ice physics.

Wilen, Larry A. 1991, (Research); PhD, 1986, Princeton University; low-temperature condensed-matter physics.

Winglee, Robert M. * 1991, (Adjunct); PhD, 1984, University of Sydney (Australia); energetic phenomena in sun/earth plasmas, excitation of waves, high energy particle acceleration.

Yu, Nan 1988, (Research); PhD, 1988, University of Arizona; experimental atomic physics.

Senior Lecturer

Robertson, Charles E. 1990; MS, 1981, University of Washington; physics education.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

PHYS 101-102, 103 Physical Science by Inquiry I (5-5, 5) NW, QSR Laboratory-based development of concepts and reasoning skills. Helps prepare preservice teachers to teach science by inquiry. Liberal arts students gain experience in the scientific process. Useful for students with weak science preparation before taking standard science courses. Forms foundation for scientific literacy. No 101 credit without 102. Prerequisites: 101- for -102; -102 for 103. Offered: A-W, Sp.

PHYS 104 Introduction to Mechanics (3) NW Problem-solving techniques applicable to elementary Newtonian mechanics. Prerequisite: concurrent registration in 103.

PHYS 110, 111 Liberal Arts Physics (5, 5) NW, QSR Basic concepts of physics presented with emphasis on their origin and their impact on society and the Western intellectual tradition. Primarily for students in the arts, humanities, and social sciences. Prerequisites: 110 for 111. Offered: S, W.

PHYS 114, 115, 116 General Physics (4, 4, 4) NW, QSR Basic principles of physics presented without use of college-level mathematics. Suitable for students majoring in technically oriented fields other than engineering or the physical sciences. Concurrent registration in 117, 118, 119 strongly recommended. 114: mechanics and sound. 115: heat and electromagnetism. 116: light and modern physics. Prerequisites: working knowledge of algebra and trigonometry, one year of high school physics; 114 for 115; 115 for 116. Offered: AWSpS, AWSpS, AWSpS.

Credit is not given for both 114 and 121, 115 and 122, 116 and 123, 117 and 131, 118 and 132, 119 and 133.

PHYS 117, 118, 119 General Physics Laboratory (1, 1, 1) NW 117: mechanics laboratory, to be taken concurrently with 114. 118: heat and electromagnetism laboratory, to be taken concurrently with 115. 119: sound, light, and modern physics laboratory, to be taken concurrently with 116. Credit/no credit only. Offered: AWSpS, AWSpS, AWSpS.

The courses 121, 122, 123, 224, 225 plus appropriate laboratory together make up the general physics sequence for science and engineering students.

PHYS 121 Mechanics (4) NW, QSR Basic principles of mechanics. Concurrent registration in 131 required. Prerequisites: one year of high school physics

or permission of physics academic adviser, concurrent or previous MATH 124 or 134. Offered: AWSpS.

PHYS 122 Electromagnetism and Oscillatory Motion (4) NW Basic principles of electromagnetism, the mechanics of oscillatory motion. Concurrent registration in 132 required. Prerequisites: 121; concurrent or previous MATH 125 or 135. Offered: AWSpS.

PHYS 123 Waves (4) NW Electromagnetic waves, optics, and waves in matter. Concurrent registration in 133 required. Prerequisites: 122, concurrent or previous MATH 126 or 136. Offered: AWSpS.

PHYS 131, 132, 133 Experimental Physics (1, 1, 1) NW Experimental topics in physics for science and engineering majors. Prerequisites: concurrent or previous enrollment in 121 for 131; 122 for 132; 123 for 133. Offered: AWSpS, AWSpS, AWSpS.

PHYS 205 Concepts of Physical Science (3) NW The nature, origin, and use of selected concepts of the physical sciences.

PHYS 207 The Physics of Music (3) NW The nature of sound; vibrations; traveling and standing waves; response of the ear to sound; production of musical sounds.

PHYS 208 The Physics of Sports (3) NW Record performances of top athletes shown close to limits imposed by physical laws. Studies the science of motion, forces, momentum, collisions, energy, and power. Emphasizes application of these ideas to human physiology and human experience such as sprinting, high jumping, baseball, tennis, football, and other sports. Offered: Sp.

PHYS 210, 211, 212 Physics by Inquiry I (5, 5, 5) NW Selected topics in physics with emphasis on depth of understanding and development of skills essential to the scientific process. Background for teaching physics and physical science as a process of inquiry. Prerequisites: permission of instructor and three quarters of 100-level physics for 210; 210 for 211; 211 for 212. Offered: A, W, Sp.

PHYS 214 Light and Color (5) NW, QSR Compares past explanation of certain familiar natural phenomena with present understandings. Lamps and lighting, outdoor light, optical devices, color vision, perspective, paints, and pigments. Quantitative comparison critical to the course, but college-level mathematics background not required. Intended for nonscience students. Offered: A.

PHYS 215 Order and Disorder (5) NW, QSR Includes symmetry in biological systems and in inanimate nature, relation of structure to size, and micro- and macrostructure of universe, systems in chaos. Quantitative comparison critical to course, but college-level mathematics background not required. 214, 215, 216 may be taken independently or in any order. Intended for nonscience students. Offered: W.

PHYS 216 Time and Change (5) NW, QSR Includes miracles and magic, how and why things move, basic forces in nature, quantum mechanics, relativity, past and future of the universe. Quantitative comparison critical to course, but college-level mathematics background not required. 214, 215, 216 may be taken independently or in any order. Intended for nonscience students. Offered: Sp.

PHYS 224 Thermal Physics (3) NW Introduction to heat, thermodynamics, elementary kinetic theory, and the physics of continuous media. Prerequisites: 122, which may be taken concurrently, and MATH 126. Offered: AWSpS.

PHYS 225 Modern Physics (3) NW Special theory of relativity; phenomena of modern physics with emphasis on photons, electrons, and atoms; introduction to quantum physics. Prerequisites: 123, concurrent or previous MATH 126 or 136. Offered: AWSpS.

PHYS 227, 228 Elementary Mathematical Physics (3, 3) NW Applications of mathematics in physics with emphasis on the mechanics of particles and continuous systems. Prerequisites: 123, MATH 307; 227 for 228. Offered: W, Sp.

PHYS 311 Relativity and Gravitation (3) NW Special theory of relativity, Newtonian gravity, and relativistic effects of gravitation, including black holes, gravitational waves, and applications to cosmology. Prerequisite: 123, MATH 126.

PHYS 321, 322, 323 Electromagnetism (3, 3, 3) NW Charges at rest and in motion; dielectric and magnetic media; electromagnetic waves; relativity and electromagnetism; physical optics. Prerequisites: 123, 228, MATH 324, which may be taken concurrently, for 321; 321 for 322; 322 for 323. Offered: A, W, Sp.

PHYS 324, 325 Quantum Mechanics (3, 3) NW Introduction to nonrelativistic quantum mechanics. Prerequisites: 225, 228, MATH 324 for 324; 324 for 325. Offered: A, W.

PHYS 327 Introduction to Nuclear Physics (3) NW Nuclear structure, including nuclear reactions, fission; particle accelerators, and nuclear instrumentation; applications of nuclear phenomena in atomic energy and astrophysics. Prerequisite: 225 or permission of instructor. Offered: W.

PHYS 328 Statistical Physics (3) NW Elements of statistical mechanics and their applications. Prerequisites: 224, 225, 227, 324 or a similar introduction to quantum mechanics; MATH 324. Offered: Sp.

PHYS 331 Optics Laboratory (3) NW Optical and spectroscopic measurements. Prerequisites: 123 and 227. Offered: Sp.

PHYS 334, 335 Electric Circuits Laboratory (3, 3) NW Basic elements of DC, AC, and transient circuits; electronic devices; electrical measurements. Prerequisites: 123, MATH 126 or 136 for 334; 334 for 335. Offered: W, Sp.

PHYS 341 Energy: Consumption Patterns, Fossil Fuels, and Conservation (3) NW Survey of energy use, especially in the United States. Fossil fuels with emphasis on resource availability and on greenhouse effects and other environmental consequences. Methods for reducing consumption through conservation. Offered: jointly with ENGR 341; A.

PHYS 342 Energy: Nuclear and Solar Power (3) NW Technology of nuclear power, especially fission power, and of the major forms of solar power, including hydroelectric power, wind power, and biomass. Consideration given to the factors limiting the utilization of these sources. Offered: jointly with ENGR 342; W.

PHYS 343 Environmental Radioactivity (3) NW Sources of radioactivity in the environment, including both natural sources, especially radon, and manmade sources, especially nuclear power and nuclear explosions. Emphasis given to methods for determining radiation doses from the significant sources. Offered: jointly with ENGR 343/ENV H 343; Sp.

PHYS 401, 402, 403 Special Problems (* max. 30, * max. 30, * max. 30) Supervised individual study. Offered: AWSpS, AWSpS, AWSpS.

PHYS 405-406 Physical Science by Inquiry II (5-5) NW Emphasis on depth of understanding and development of reasoning and representational skills essential to the scientific process. Provides background for teaching physical science as a process of inquiry and develops scientific literacy. Prerequisite: permission of instructor. Offered: A-W.

PHYS 407, 408, 409 Physics by Inquiry II (5, 5, 5) NW Selected topics in physics, with emphasis on depth of understanding and development of skills essential to the scientific process. Background for teaching physics at secondary school and introductory college levels. Some mathematical proficiency required.

Prerequisites: permission of instructor; 407 for 408, 408 for 409. Offered: A, W, Sp.

PHYS 410 Physics by Inquiry for In-service Teachers (1-2, max. 10) NW A "hands-on" inquiry-oriented approach designed to train in-service teachers in the use of the physical science content for any of several science programs selected by a school or school district. Credit/no credit only. Prerequisite: permission of instructor.

PHYS 411, 412, 413 Physics by Inquiry for Lead Teachers (1-4, max. 4; 1-4, max. 4; 1-4, max. 4) NW Extends the content covered in previous courses and helps prepare lead teachers to train colleagues to use any of several science programs selected by schools or districts. Prerequisite: at least two of 405, 406, 407, 408, 409 or equivalent and permission of instructor. Offered: A, W, Sp.

PHYS 421 Atomic and Molecular Physics (3) NW Survey of the principal phenomena of atomic and molecular physics. Prerequisites: 323 and 325, or permission of instructor. Offered: A.

PHYS 422 Nuclear and Elementary-Particle Physics (3) NW Survey of the principal phenomena of nuclear and elementary-particle physics. Prerequisites: 323 and 325, or permission of instructor. Offered: W.

PHYS 423 Solid-State Physics (3) NW Survey of the principal phenomena of solid-state physics. Prerequisites: 323 and 325, or permission of instructor. Offered: Sp.

PHYS 424, 425, 426 Mathematical Physics (3, 3, 3) NW 424: advanced classical mechanics. 425, 426: mathematical techniques of particular use in physics, including partial differential equations. Prerequisites: 323 and 325, or permission of instructor for 424 or 425; 425 for 426. Offered: A, W, Sp.

PHYS 427 Applications of Physics (1-3, max. 12) NW Current applications of physics to problems in the sciences and technology.

PHYS 428 Selected Topics in Physics (1-3, max. 12) NW

PHYS 431, 432, 433 Modern Physics Laboratory (3, 3, 3) NW 431, 432: measurement in modern atomic, molecular, and solid-state physics. 433: techniques in nuclear and elementary-particle research. Prerequisites: 30 credits in physics or permission of instructor for 431, 432; 327 or 422 or permission of instructor for 433. Offered: A, W, Sp.

PHYS 434 Application of Computers to Physical Measurement (3) NW Laboratory giving specific instruction and experience in interfacing laboratory equipment to computers. Prerequisite: 335 or permission of instructor. Offered: A.

PHYS 436 Nonlinear Dynamics and Chaos (4) NW Variational Principle, Lagrangian and Hamiltonian Mechanics, phase space, nonlinear dynamics, approach to chaos, Lyapunov exponents, applications to physical systems. Numerical exercises to illustrate phenomena. Prerequisites: 126 and MATH 309 or equivalents.

PHYS 441 Quantum Physics (4) NW Methods of quantum mechanics and applications to physical systems. Examples from atomic and molecular systems, nuclear physics, solid-state physics. Typical preparation: 30 credits in physical science or engineering. Offered: W.

PHYS 485, 486, 487 Senior Honors Seminar (1, 1, 1) NW Offered: A, W, Sp.

PHYS 491, 492, 493 Independent Research (1-3, max. 3, 1-3, max. 3, 1-3, max. 3) Supervised, independent study requiring written and oral presentations summarizing work accomplished. Prerequisites: 12 credits in physics above 200-level or permission of instructor. Offered: A, W, Sp.

PHYS 494, 495, 496 Seminar on Current Problems in Physics (1-3, max. 3, 1-3, max. 3, 1-3, max. 3) NW Supervised, independent study of topics (chosen by faculty in charge) of current interest in physics. Written and oral presentation summarizing work accomplished are required. Prerequisites: 12 credits in physics above 200-level or permission of instructor. Offered: A, W, Sp.

Courses for Graduates Only

PHYS 501, 502, 503 Tutorials in Teaching Physics (1, max. 2, 1, max. 2, 1, max. 2) McDermott Preparation for teaching introductory physics; use and critical analysis of instructional materials in a collaborative learning environment; supervised teaching practicum in which instructional materials are used with undergraduates. Credit/no credit only. Offered: A, W, Sp.

PHYS 505 Mechanics (3) Lagrangian and Hamiltonian dynamics, with applications to various topics such as coupled oscillators, parametric resonance, anharmonic oscillations, chaos. Offered: A.

PHYS 506 Numerical Methods (3) Integration, solution of differential equations, Monte Carlo methods; function minimization, data analysis, modern computing techniques, computation in experimental physics. Offered: W.

PHYS 507 Physical Applications of Group Theory (3) Applications of finite and continuous groups, representation theory, symmetry, and conservation laws to physical systems. Offered: Sp.

PHYS 511 Topic in Contemporary Physics (1) Topics of current experimental, theoretical, or technological interest in modern physics. Offered: Sp.

PHYS 513, 514, 515 Electromagnetism and Relativity (4, 3, 4) Principles of electrostatics, complex variable techniques, boundary value problems and their associated mathematical techniques, Green's functions. Electric and magnetic fields in free space and material media, wave guides and cavity resonators. Special relativity, electromagnetic radiation from accelerated charges, synchrotron radiation, Cerenkov radiation, radiation reaction. Offered: A, W, Sp.

PHYS 517, 518, 519 Quantum Mechanics (4, 4, 4) The uncertainty principle and the interpretation of quantum mechanics; solutions of the Schrodinger equation in three dimensions; Dirac notation and matrix formulation; angular momentum; Wigner-Eckart theorem; elementary collision theory; density matrix; approximation methods; atomic structure; semiclassical radiation theory; introduction to group theory and symmetry. Offered: A, W, Sp.

PHYS 520, 521 Advanced Quantum Mechanics: Introduction to Quantum Field Theory (3) Multi-particle systems, second quantization, diagrammatic perturbation theory, radiation, correlation functions and multi-particle scattering, relativistic theories, renormalizability, basic quantum electrodynamics, and other applications. Offered: A, W.

PHYS 522 Advanced Quantum Mechanics: Introduction to Modern Quantum Field Theory (3) Functional integrals, symmetry breaking, critical phenomena and continuum limits, and non-perturbative methods. Offered: Sp.

PHYS 524 Thermodynamics and Statistical Mechanics (4) Statistical mechanical basis of the fundamental thermodynamical laws and concepts; classical and quantum statistical distribution functions; applications to selected thermodynamic processes and examples of Bose and Fermi statistics. Offered: W.

PHYS 525 Statistical Mechanics (3) Introduction to equilibrium and non-equilibrium aspects of many-body systems; scale invariance and universality at phase transitions and critical phenomena; exactly soluble models; Markov processes, master equations and Langevin equation in non-equilibrium stochastic processes. Prerequisite: 524. Offered: A.

PHYS 527, 528 Current Problems in Physics (1, 1) Introduction to current research topics for beginning graduate students. Credit/no credit only. Offered: A, W.

PHYS 530 Laser Physics (4) Physics underlying laser design and operation in the context of common laboratory systems. Topics may include continuous and pulsed lasers; solid, liquid, and gas gain media; Q-switching, mode-locking, resonator theory, nonlinear optics, and others. Prerequisites: basic quantum mechanics, electromagnetism, and optics. Recommended: 541.

PHYS 531 Fluid Mechanics (4) Mechanics of ideal and viscous fluids. Topics may include turbulence, thermal conduction and diffusion, shock waves, and others.

PHYS 532 Liquid Crystal Devices (4) Physics of liquid crystals and applications to practical display devices. Phases, phase transitions, optical and dielectric properties, molecular and device "engineering," future prospects.

PHYS 541 Applications of Quantum Physics (4) Techniques of quantum mechanics applied to lasers, quantum electronics, solids, and surfaces. Emphasis on approximation methods and interaction of electromagnetic radiation with matter. Prerequisite: 421 or 441 or equivalent. Offered: Sp.

PHYS 542 Numerical Methods in Physics (4) Numerical methods for analysis and computation in physics. Topics include: interpolation, approximation, integration, differential and difference equations, transcendental equations, optimization. Emphasis on physical applications, eigenvalue and scattering problems, modeling.

PHYS 543 Electromagnetic Waves (4) Principal concepts of electromagnetism. Boundary-value problems. Electromagnetic waves with applications in materials, optics, wave guides. Prerequisite: 30 credits in physical sciences or engineering. Offered: A.

PHYS 544 Electromagnetic Theory and Plasma Physics (4) Review of electromagnetic theory in terms of Maxwell's equations. Basic fluid mechanics and kinetic theory. Magnetohydrodynamics and plasma physics with the aim of providing an understanding of the principles underlying fusion reactors and other applications. Prerequisite: 543 or equivalent.

PHYS 545 Contemporary Optics (4) Coordinated lecture and laboratory treatment of topics in contemporary optics. Subjects include Fourier optics, lens systems, interferometry, laser optics, holography, polarization, crystal optics, birefringence, laser and conventional light sources, optical detectors. Prerequisite: 543 or equivalent.

PHYS 546 Condensed-Matter Physics (4) Experimental techniques for investigating surface geometrical and electronic structure, surface composition, and surface thermodynamics. Auger electron spectroscopy, photo-electron spectroscopy, low-energy electron diffraction, ion sputtering. Prerequisite: 441 or equivalent.

PHYS 547 Electronics for Physics Research (4) Electronic techniques as applied in physics research. Topics include noise, control-system analysis, operational amplifiers, lock-in amplifiers, precision power supplies and metering, data transmission, microprocessors. Several integrated measurement systems are examined in the context of specific research problems. Prerequisite: elementary electronics.

PHYS 548 Nuclear Instrumentation (4) Techniques of nuclear particle detection and radiation detection; position detection; signal preparation and amplification; signal transmission and termination; noise suppression; pulse height discrimination; analog signal processing; fast logic; fast and slow timing; time-to-amplitude conversion; pile-up rejection; singles pulse

height analysis; multiparameter pulse height analysis; computer-based data collection; interfacing. Prerequisites: 334 and 335 or equivalents.

PHYS 549 Low-Temperature Physics and Cryogenics (4) Condensed-matter physics at low and ultralow temperatures. Production of low temperatures; liquefaction of gases, dilution refrigeration, magnetic and compressional cooling. Macroscopic quantum effects: superconductivity, superfluidity. Applications of superconductors. The ultralow temperature frontier.

PHYS 550, 551 Atomic Physics (3, 3) Theory of atomic structure and spectra; atomic and molecular beams; resonance techniques; atomic collisions; topics of current interest. Prerequisite: 519.

PHYS 552 Introduction to Cosmic Ray Physics (3) The nature and cosmological significance of cosmic ray photons and particles. The motion and confinement of particles in the geophysical, interplanetary, and interstellar medium. Theories of the processes involved in the high-energy interaction of cosmic rays, including shower theory. Methods of measurement and current problems. Prerequisite: introductory quantum mechanics.

PHYS 557, 558, 559 High Energy Physics (3, 3, 3) High-energy kinematics; phenomenology of high-energy collisions. Second quarter is devoted to strong interactions, and the third quarter discusses weak interactions. Experimental results are emphasized. Prerequisite: 519. Offered: A, W, Sp.

PHYS 560, 561, 562 Theoretical Nuclear Physics (3, 3, 3) Nuclear structure, scattering, reactions, and decays in terms of elementary properties of nucleons and current theoretical models. Prerequisite: 519. Offered: A, W, Sp.

PHYS 564, 565 General Relativity (3, 3) General covariance and tensor analysis, the relativistic theory of gravitation as given by Einstein's field equations, experimental tests and their significance, and applications of general relativity, particularly in the areas of astrophysics and cosmology. Prerequisite: 515.

PHYS 567, 568, 569 Theory of Solids (3, 3, 3) A three-quarter course covering the fundamentals of solid-state physics. Various topics in solid-state physics are covered in considerable detail, bringing knowledge up to the current literature. Prerequisite: 519. Offered: A, W, Sp.

PHYS 570, 571 Quantum Field Theory (3, 3) Emphasis varies in different years between relativistic quantum field theory and the many-body problem. Prerequisite: 522.

PHYS 572 Modern Quantum Field Theory (3) Advanced topics in quantum field theory. Prerequisites: 570, 571.

PHYS 576 Selected Topics in Experimental Physics (* max. 30)

PHYS 578 Selected Topics in Theoretical Physics (* max. 30)

PHYS 580 Physics Colloquium (* max. 30) Credit/no credit only. Offered: AWSp.

PHYS 581 Seminar in High-Energy Physics (* max. 30) Credit/no credit only. Offered: AWSp.

PHYS 582 Seminar in Particle Theory (* max. 30) Credit/no credit only. Offered: AWSp.

PHYS 583 Seminar in Relativistic Astrophysics (* max. 30) Credit/no credit only. Offered: AWSp.

PHYS 584 Seminar in Atomic Physics and Coherent Spectroscopy (* max. 30) Credit/no credit only. Offered: AWSp.

PHYS 585 Seminar in Experimental Nuclear Physics (* max. 30) Credit/no credit only. Offered: AWSp.

PHYS 586 Seminar in Condensed Matter Physics (* max. 30) Credit/no credit only. Offered: AWSp.

PHYS 587 Seminar in Nuclear Theory (* max. 30) Credit/no credit only. Offered: AWSp.

PHYS 588 Seminar in Cosmic Ray Physics (* max. 30) Credit/no credit only. Offered: AWSp.

PHYS 589 Seminar in Problems of Physics Education (* max. 30) Credit/no credit only. Offered: AWSp.

PHYS 590 Seminar in Statistical Physics (1, max. 30) Credit/no credit only. Offered: AWSp.

PHYS 600 Independent Study or Research (*) Study or research under the supervision of individual faculty members. Prerequisite: permission of supervisor. Credit/no credit only. Offered: AWSpS.

PHYS 800 Doctoral Dissertation (*) Prerequisite: permission of Supervisory Committee chairperson. Credit/no credit only. Offered: AWSpS.

Political Science

101 Gowen

Students of political science examine the theory and practice of government and politics. They acquire knowledge of political institutions and processes and learn to think critically about public policies and their consequences. They learn how to evaluate individual, group, and mass behavior in political settings. Because of their understanding and interest in political systems, students who major in political science enter such career fields as government service, law, business, journalism, politics, public policy analysis, and education.

The department is organized into four major fields of study: political theory, American government and politics, international relations, and comparative politics. Several subfields—public law, law and public policy, political culture, and political economy—cut across these main areas and provide focused specializations for both undergraduate and graduate students. The department has long been renowned in comparative and international politics, especially in the study of Asian political phenomena, in public law, and in American government and politics. The department has also augmented its faculty strength in political and feminist theory as well as in political economy.

Undergraduate Program

Students begin their concentration by choosing three basic courses that define the discipline and its major fields of interest, then advance to more specialized study in the field areas. The undergraduate program is designed to provide broad knowledge of the discipline, to emphasize the acquisition of research skills for students who will seek advanced degrees, and to offer practical experience through internships and fieldwork courses for students who will seek employment after completing the baccalaureate degree.

Bachelor of Arts

Admission Requirements: (1) Sophomore standing (completion of minimum 45 college credits); (2) minimum 2.00 UW cumulative GPA; (3) three introductory courses in the discipline, either completed or in the process of being completed, from among POL S 101, 201, 202, 203, 204, and 205 (or equivalents). Students are admitted all quarters; applications and additional information available from advisers in 115 Gowen.

Major Requirements: 50 credits in political science, including (1) three courses (15 credits) in introductory political science field courses from POL S 101, 201, 202, 203, 204, 205; (2) three courses (15 credits) in

field courses numbered POL S 212 and above—at least one course in each of three different areas of political science study: the five areas from which to select this requirement are political theory, comparative government, international relations, American government, and research methods; (3) 20 credits of elective political science course work numbered POL S 212 and above; (4) minimum cumulative GPA of 2.25 in political science courses at graduation. Transfer and postbaccalaureate students must meet all the above requirements and complete a minimum of 10 upper-division political science credits at the UW.

Political Economy: The department also offers a political economy focus, a specialized program of study that combines political science and economics, emphasizing rational choice theory. Students who wish to pursue this interdisciplinary concentration should consult with a political science adviser. A list of recommended course work is available.

Internships: In order to prepare students for career opportunities, the department offers three internship programs that range from part-time, 5-credit assignments to full-time, 15-credit programs. Students can elect to work in local agencies (POL S 496), in the state legislature during winter quarter (POL S 497), and in Washington, D.C. (POL S 498). Students in all majors may apply for the Washington Center Program, which places students in Washington, D.C., during every academic quarter. Additional information is available from departmental advisers in 115 Gowen.

Minor

Minor Requirements

30 credits from one of the following options (see department for course lists and suggested course tracks):

American Government: POL S 202; 20 credits Group D electives; 5 credits Group D 400-level elective.

Comparative Politics: POL S 204; 20 credits Group B electives; 5 credits Group B 400-level elective.

International Relations: POL S 203; 20 credits Group C electives; 5 credits 400-level Group C elective.

Political Science (General): One from POL S 101, 201, 202, 203, 204, 205; 20 credits POL S electives; 5 credits 400-level POL S elective.

Political Theory: POL S 201; 20 credits Group A electives; 5 credits 400-level Group A elective.

Graduate Program

Graduate study in political science integrates traditional education in political science's primary fields with other fields in the social sciences allowing an eclectic, interdisciplinary approach.

Graduate work in political science is organized primarily as preparation for the Doctor of Philosophy degree. The Master of Arts program option serves as the initial stage of the Ph.D. program.

A bachelor's degree is required for admission to the M.A. program. M.A. aspirants must submit and orally defend an essay of distinction (POL S 598), and complete course requirements in two fields. One of these fields must be chosen from four general fields: political theory, international relations, comparative politics, and American politics. The second field may be a second general field or one of the specialized fields (including, but not limited to): area study, public law, or political economy. The M.A. degree requires the completion of 46 credits, of which 23 must be at the 500 level or above. Two courses in foundations of political analysis are required.

For admission to the Ph.D. program, students are expected to have completed an M.A. degree in political science (or an equivalent program) in this department

or elsewhere. The doctoral student must prepare a total of three fields—a minimum of one general field; a second general field and/or one or more specialized fields, and/or at most one non-designated field. Two courses in quantitative political analysis and an elective methodology course are required. Competence in a foreign language is required only if deemed appropriate by the student's Supervisory Committee. The doctoral degree requires the completion of 124 graduate credits, of which at least 58 must be at the 500 level or above; 36 credits are allowed for the dissertation. To be advanced as a doctoral candidate, a student must complete all of the above, and a second essay of distinction (POL S 599), a written examination in each of the three fields, and a comprehensive oral examination. Once advanced to candidacy, students must write, and orally defend, their dissertation thesis.

The department has long been outstanding in comparative and international politics, especially in the study of Asian political phenomena. The department has augmented its faculty strength in American politics, Western European politics, political theory, international relations, political economy, public policy, public law, and methodology. Graduate students can pursue studies in other campus units, such as the School of Marine Affairs, the Graduate School of Public Affairs, the Henry M. Jackson School of International Studies, the School of Communications, and the School of Law.

Research Facilities

The University library system, the largest research library in the Pacific Northwest, has a collection of five million volumes, with specialized collections for the Pacific Northwest, Near East, South Asia, and Slavic and East European areas. A political science reference librarian is available in the Suzzallo and Allen Libraries to assist graduate students and the specialized needs of the department. Specialized access to computing facilities and extensive data holdings is available through the Center for Social Science Computation and Research. The University is a member of the Inter-University Consortium for Political and Social Research.

Admission

The department admits for autumn quarter only. January 15 is the application deadline. Admission and financial aid decisions are based on the applicant's academic transcript, Graduate Record Examination general test scores (no subject test is required), three letters of reference, a statement of purpose, and a writing sample. Foreign students are required to submit TOEFL scores.

Financial Aid

Fellowships, research assistantships, and teaching assistantships are available to qualified graduate students including those in their first year of study.

Correspondence and Information

Graduate Program Coordinator
101 Gowen, Box 353530

Faculty

Chair

W. Lance Bennett

Professors

Bennett, W. Lance * 1974; MPhil, 1973, PhD, 1974, Yale University; American politics, comparative politics, political communication, mass media, political culture.

Brass, Paul R. * 1965; PhD, 1964, University of Chicago; comparative politics (South Asia).

Burstein, Paul * 1985, (Adjunct); PhD, 1974, Harvard University; political sociology, social stratification, public policy, law.

Caporaso, James A. * 1988; PhD, 1968, University of Pennsylvania; international political economy, comparative politics, European community, research methodology.

Cassinelli, Charles W. * 1960, (Emeritus); PhD, 1953, Harvard University; comparative government (Latin America).

Gerberding, William P. * 1979; PhD, 1959, University of Chicago; American government and politics, public policy.

Gore, William J. * 1966; (Emeritus); PhD, 1952, University of Southern California; public policy, public administration.

Hellmann, Donald C. * 1967; PhD, 1964, University of California (Berkeley); Japanese politics and international relations.

Lang, Gladys Engel * 1984, (Emeritus); PhD, 1954, University of Chicago; political effects of mass media, sociology of art, political movements and crowd behavior.

Lev, Daniel S. * 1970; PhD, 1964, Cornell University; comparative politics (Southeast Asia).

Levi, Margaret Anne * 1974; PhD, 1974, Harvard University; comparative politics, political economy.

Matthews, Donald Rowe * 1976, (Emeritus); PhD, 1953, Princeton University; American government and politics, comparative politics (Norway, U.K.).

May, Peter J. * 1979; PhD, 1979, University of California (Berkeley); policy analysis, quantitative methods, federal disaster policy.

McCann, Michael W. * 1982; MA, 1976, PhD, 1983, University of California (Berkeley); American government and politics, public law, political theory.

McCrone, Donald J. * 1979; PhD, 1966, University of North Carolina; American politics, political economy, methodology.

Migdal, Joel S. * 1980, (Adjunct); MA, 1968, PhD, 1972, Harvard University; state and society in the Third World; Middle East politics.

Modelski, George * 1967, (Emeritus); PhD, 1954, University of London (UK); international relations, international political economy.

Olson, David J. * 1974; PhD, 1971, University of Wisconsin; American government and politics (urban, state, and labor relations).

Reshetar, John S. Jr. * 1957, (Emeritus); PhD, 1950, Harvard University; comparative government (Soviet Union), international relations.

Scheingold, Stuart A. * 1969; PhD, 1963, University of California (Berkeley); American politics (public law).

Taylor, Michael John * 1985; PhD, 1976, University of Essex (UK); political theory, political economy.

Townsend, James R. * 1968, (Emeritus); PhD, 1965, University of California (Berkeley); comparative government (China), politics of development.

Associate Professors

Bachman, David M. * 1991, (Adjunct); PhD, 1984, Stanford University; Chinese politics and foreign policy and China's political economy (1949-present); US-China relations.

Di Stefano, Christine * 1985; PhD, 1984, University of Massachusetts; political theory (modern and contemporary), feminist theory, political culture.

Goldberg, Ellis * 1985; PhD, 1983, University of California (Berkeley); political economy of the Middle East, comparative politics.

Gottfried, Alex 1951, (Emeritus); MA, 1948, PhD, 1952, University of Chicago; American government and politics.

Hartsock, Nancy C. M. * 1984; PhD, 1972, University of Chicago; feminist theory, Marxism, contemporary political theory.

Horowitz, Ruth L. * 1971; PhD, 1972, Washington University; political theory and methodology.

Keeler, John T. * 1980; PhD, 1978, Harvard University; comparative politics (Western Europe), international relations.

Majeski, Stephen J. * 1984; PhD, 1981, Indiana University; international relations, foreign policy, peace and conflict resolution.

Pool, Jonathan Robert * 1977; PhD, 1971, University of Chicago; political theory, (political economy of language).

Riley, Walter 1946, (Emeritus); MA, 1935, PhD, 1957, Stanford University; political science.

Rohn, Peter H. * 1962, (Emeritus); PhD, 1958, University of Washington; international relations, international law.

Thomson, Janice E. * 1988; MA, 1983, Arizona State University; PhD, 1988, Stanford University; international relations theory, state sovereignty, and international political economy.

Assistant Professors

Eliaison, Leslie Carol * 1988, (Adjunct); MA, 1985, PhD, 1988, Stanford University; comparative politics, European public policy, comparative education and health care policy.

Gill, Anthony J. * 1994; MA, 1989, PhD, 1994, University of California (Los Angeles); comparative politics, Latin America, political economy, methodology.

Hanson, Stephen E. * 1990; MA, 1986, PhD, 1991, University of California (Berkeley); Soviet, post-Soviet and comparative politics.

Ingebritsen, Christine * 1992, (Adjunct); PhD, 1993, Cornell University; Scandinavian domestic and foreign policies, European community integration and Scandinavia.

Litfin, Karen T. * 1991; PhD, 1992, University of California (Los Angeles); international environmental politics, globalization processes, technology and politics.

Mayerfeld, Jason * 1991; MA, 1988, PhD, 1992, Princeton University; political theory, ethics.

Simpson, Andrea Y. 1993; PhD, 1993, Emory University; American government and politics, minority politics.

Whiting, Susan H. 1994; PhD, 1995, University of Michigan; international relations (China).

Wilkerson, John D. * 1990; MA, 1989, PhD, 1991, University of Rochester; American government and politics, quantitative methodology.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

Most upper-division courses (300- and 400-level) do not require prerequisites. However, because these courses generally offer more advanced subject matter, they are recommended for juniors and seniors. Freshmen or sophomores who wish to enroll in upper-division courses may do so, but they should consult with the instructor or the departmental adviser first.

POL S 101 Introduction to Politics (5) I&S Political problems that affect our lives and shape the world around us. Recommended for nonmajors, for students who are thinking about political science as a major,

and for political science majors who haven't decided on an area of specialization. Offered: AWSpS.

POL S 201 Introduction to Political Theory (5) I&S Philosophical bases of politics and political activity. Provides an introduction to the study of politics by the reading of a few books in political philosophy. Organized around several key political concepts, such as liberty, equality, justice, authority, rights, and citizenship. Offered: AWSpS.

POL S 202 Introduction to American Politics (5) I&S Institutions and politics in the American political system. Ways of thinking about how significant problems, crises, and conflicts of American society are resolved politically. Offered: AWSpS.

POL S 203 Introduction to International Relations (5) I&S The world community, its politics, and government. Offered: AWSpS.

POL S 204 Introduction to Comparative Politics (5) I&S Political systems in a comparative framework. Traditional and contemporary approaches to the study of governments and societies in different countries. Offered: WSp.

POL S 205 Political Science as a Social Science (5) I&S Methodological perspectives of the various social science disciplines: commonalities and differences in assumptions, values, and paradigms. Current issues from the multiple perspective of social sciences; limits of the social sciences in resolving key social issues. Recommended: introductory course in one or more social science. Offered: W.

POL S 212 Philosophy of Feminism (5) I&S Philosophical analysis of the concepts and assumptions central to feminism. Theoretical positions within the feminist movement; view of the ideal society, goals and strategies of the movement, intersections of the sex-gender system with other systems of oppression. Offered: jointly with PHIL 206/WOMEN 206.

POL S 249 Introduction to Labor Studies (5) I&S Conceptual and theoretical issues in the study of labor and work. Role of labor in national and international politics. Formation of labor movements. Historical and contemporary role of labor in the modern world. Offered: jointly with HIST 249/SOC 266

POL S 270 Introduction to Political Economy (5) I&S Political economy as a tool for understanding and evaluating the political world. Combines theory, methods, and insights derived from economics and political science and applies them to a range of substantive issues.

POL S 273 The Concept of Political Power (5) I&S How to understand and explain relationships of power. Readings from Marxism, Weberian sociology, anarchism, classical political philosophy, and contemporary political science. May also include works of fiction.

POL S 281 Introduction to American Political Culture (5) VLP&I&S Introduction to the methods and theories used in the analysis of American culture. Emphasizes an interdisciplinary approach to American literature, including history, politics, anthropology, and mass media. Offered: jointly with ENGL 251.

POL S 301 Special Topics in Political Theory (5, max. 10) I&S Selected contemporary political issues. Political principles as reflected in concrete political problems. Topics might include: women's rights, civil disobedience, national health care, affirmative action, environmental protection, privacy, human rights, and redistribution of property. Recommended: introductory course in political science at the 100 or 200 level.

POL S 303 Public Policy Formation in the United States (5) I&S Policy decision making with emphasis on: how issues arise, the way they become part of the policy agenda of the executive and the legislature, how these institutions organize to handle policy issues, and the roles of the legislature, the executive, and the

bureaucracy. Public policy literature and familiarization with key aspects of policy decision making at the national, state, and local levels.

POL S 304 The Press and Politics in the United States (5) I&S Journalists' role in elections and public policy. Relationship between news coverage and political campaigns. Study and analysis of local political newswriting, reporting, and response by local and state political figures. Extensive off-campus experience included. Offered: jointly with CMU 304.

POL S 305 The Politics of Mass Communication in America (5) I&S Role of mass audiences in politics from the standpoint of the communication strategies used to shape their political involvement. Topics include: social structure and political participation, political propaganda and persuasion, the political uses of public opinion, and the mass media and politics.

POL S 308 The Western Tradition of Political Thought, Ancient and Medieval (5) I&S Origin and evolution of major political concepts from ancient Greece to the medieval period, from Thales through Aquinas. Recommended: 201.

POL S 309 The Western Tradition of Political Thought, Pre-Modern (5) I&S Continuation of 308, treating materials from the fifteenth through eighteenth centuries, Machiavelli through Rousseau. Recommended: 201.

POL S 310 The Western Tradition of Political Thought, Modern (5) I&S Continuation of 308 and 309, focusing on material from the eighteenth through twentieth centuries, from Rousseau through Lenin. Recommended: 201.

POL S 311 Individual and the State (5) I&S Individualism and communitarian critics. Political and ethical implications of both. Nature of the state, liberty, responsibility, cooperation. Important individualist and collectivist literature, dealing with market institutions and citizen politics, critically assessed.

POL S 313 Women in Politics (5) I&S Theoretical, historical, and empirical studies of women's participation in political and social movements. Women's diverse efforts to improve their political, social, and economic status. Policy issues of particular concern to women. Women's political experiences in household, local, regional, national, and international arenas Offered: jointly with WOMEN 313.

POL S 316 African-American Political and Social Thought (5) I&S Race relations in U.S. politics as defined by the struggle of African-Americans for economic, political, and social equality. Studies of African-American political and social thought; expands and clarifies our understanding of the strengths and weaknesses of American democratic ideals.

POL S 317 The Politics of Race in the United States (5) I&S Political and social dilemma created by the attempt to reconcile ethnic and national identity. Effort of African-Americans to resolve this dilemma examined through the writings of contemporary political scholars.

POL S 318 American Political Thought I (5) I&S Major thinkers and themes in American political and cultural development from Puritan origins to the Civil War.

POL S 319 American Political Thought II (5) I&S Major thinkers and themes in American political and cultural development from the Civil War to the present.

POL S 321 American Foreign Policy (5) I&S Constitutional framework; major factors in formulation and execution of policy; policies as modified by recent developments; the principal policymakers—President, Congress, political parties, pressure groups, and public opinion. Recommended: 101 or 202.

POL S 324 Europe in World Politics (5) I&S Independent and coordinated efforts of Britain, France, and

West Germany to adapt to the post-World War II global system. Creation and development of the Atlantic alliance. Relations with the Soviet bloc. Decolonization and the evolution of relations with the Third World. The movement for European integration. Prerequisite: 203 or equivalent.

POL S 325 The Arab-Israeli Conflict (5) I&S The politics of conflicting ideologies: Zionism and Arab nationalism; formation of the state of Israel; development of Palestinian nationalism; Arab-Israeli wars. Re-emergence of Palestinian activism; domestic sources of foreign policy; the role of the superpowers.

POL S 326 Scandinavia In World Affairs (5) I&S Introduction to the foreign relations of Scandinavia with a focus on Nordic security, international economic pressures, and global conflict resolution. Survey of the national settings for international involvements and highlights the dilemmas for industrial societies exposed to the pressure of interdependence. Offered: jointly with SCAND 326.

POL S 328 International Organizations (5) I&S Explores historical, theoretical, and empirical aspects of the United Nations, its specialized agencies, and other international organizations, both governmental and nongovernmental. Prerequisite: 203.

POL S 331 Government and Politics In the Middle East and North Africa (5) I&S Breakdown of traditional society and the problems of building modern political systems.

POL S 340 Government and Politics of South Asia (5) I&S Comparison of problems of national integration and political development in India, Pakistan, and Ceylon. Offered: jointly with SISSA 340.

POL S 341 Government and Politics of Canada (5) I&S Critical analysis of parliamentary institutions, political parties, and the federal system in Canada. Offered: jointly with SISCA 341.

POL S 342 Government and Politics of Latin America (5) I&S Analysis of the political dynamics of change in Latin America comparing various national approaches to the political problems of modernization, economic development, and social change.

POL S 343 Politics and Change In Southeast Asia (5) I&S Government and politics in the countries of Southeast Asia, with attention given to the nature of the social and economic environments that condition them. Offered: jointly with SISSE 343.

POL S 346 Governments of Western Europe (5) I&S Modern government and politics of Great Britain, France, Germany, and Italy.

POL S 350 Government and Interest Groups In the United States (5) I&S Agrarian, labor, professional, business, and ethnic interest in politics; impact on representative institutions and governmental processes. Recommended: 101.

POL S 351 The American Democracy (5) I&S Democratic theory; constitutional theory; the Presidency; Congress; the Supreme Court; civil rights and civil liberties. Designed for nonmajors. Recommended: 202 or equivalent.

POL S 352 American Political Parties (5) I&S Theories of American parties, campaigns and voting behavior; party leadership; political socialization and participation. Recommended: 101 or 202.

POL S 353 United States Congress (5) I&S Organization and procedure of Congress, state legislative politics, lobbying, legislative roles, theory and practice of representative government. Prerequisite: 101 or 202.

POL S 354 Elections and Voting In the United States (5) I&S Electoral institutions and processes of the United States: the idea and practice of elections, the electoral system, individual voting behavior, collec-

tive voting behavior, and the impact of elections on policy. Recommended: 101 or 202.

POL S 355 The American Presidency (5) I&S The American presidency; its evolution, its occupants, and its place within the American system. Topics include presidential character, war, elections, Watergate, the economy, and the Constitution.

POL S 356 Society and Politics (5) I&S Focus on the causes of political change in democratic countries, including public opinion, social movements, interest group activity, and party organization. Offered: jointly with SOC 356.

POL S 360 Introduction to United States Constitutional Law (5) I&S Growth and development of the United States Constitution as reflected in decisions of the Supreme Court; political, social, and economic effects.

POL S 361 United States Courts and Civil Liberty (5) I&S Cases and literature bearing on protection of constitutionally guaranteed private rights, with particular reference to the period since 1937.

POL S 363 Law in Society (5) I&S Inquiry into how law matters in social practice. Examines general theories of law, the workings of legal institutions, and the character of legally constituted practices and relationships in diverse terrains of social life. Offered: jointly with SO JU 363.

POL S 365 Lawyers in American Politics (5) I&S Influence of lawyers on American politics. Official and unofficial political roles, lawyers as lobbyists, as legislators, in the bureaucracy, politics of the American Bar Association. Includes study of legal education, professional values, and avenues of political access.

POL S 382 State Government (5) I&S Focus on the structures, processes, and policy outputs of state governments in the United States.

POL S 383 Environmental Politics and Policy In the United States (5) I&S Interrelation between technological and environmental change and policy formation. Consideration of political behavior related to these phenomena and the capacity of urban public organizations to predict change and to formulate policies that can take future states into account.

POL S 398 Honors Seminar (5, max. 15) I&S Intensive and advanced studies in various aspects of political science. Open only to participants in the departmental honors program.

POL S 401 Advanced Special Topics In Political Theory (5, max. 10) I&S Topics can include, but are not limited to, analytical theory pertaining to justice, exploitation, and freedom; revolution and social changes; collective choice and action; sexuality and politics; critical theory; Marxist theory; post-structuralism. Content varies. Prerequisite: 201.

POL S 403 Advanced Special Topics In International Relations (5, max. 10) I&S Examination of contemporary developments in the field of international relations. Content varies according to the nature of developments and research interests of the instructor.

POL S 405 American Politics Seminar (5, max. 10) I&S Intensive reading and research in selected problems or fields of political analysis. Recommended: 202.

POL S 406 Marxian Political Economy (5) I&S Explores the relationship between social classes, the state, and political power in advanced capitalist societies. Investigates this relationship primarily by means of the tools of Marxian political economy and, in the process, evaluates these tools. Emphasis on theoretical perspectives, although the reading list has a few empirical applications as well. Prerequisite: 201.

POL S 407 International Conflict (5) I&S Many forms of international conflict, including global wars, local wars, antiregime wars, military interventions, and

international crises. Several political, social, and anthropological explanations for conflicts and examination of alternative world futures.

POL S 408 Political Conflict Theory (5) I&S Verbal and mathematical models designed to explain, win, prevent, and resolve conflicts. Search for a unified theory of political conflict applicable to all issues (environmental, industrial, ethnic, territorial, moral) and all processes (negotiation, voting, arbitration, strikes, lawsuits, arms races, war, terrorism). Recommended: 290 or 300.

POL S 409 Undergraduate Seminar In Political Economy (5, max. 10) I&S Seminar in political economy with focus on Marxian and public choice approaches to political economy. Explores the questions raised by each approach, the assumption(s) and testability of hypotheses, and applies these approaches to a number of problems in political economy. Prerequisites: 270, ECON 300, and permission of instructor. Offered: jointly with ECON 409.

POL S 410 Technology, Politics, and the State (5) I&S Relationships between politics, technological change, and development of multinational corporations. Considers whether the relations between political and economic systems of industrial societies have been fundamentally altered by the increased importance and interdependence of government, experts, and new technological possibilities for intervention in social life.

POL S 411 Theories of the State (5) I&S Topics may include origins and development of the state; arguments about the necessity, desirability, and proper role of the state; the nature and operation of modern states and the international state system; the legitimacy of modern state power.

POL S 413 Contemporary Political Theory (5) I&S Analysis of political theorists, exploring contemporary theories of humanity and society that form the basis for differing political ideas.

POL S 414 Politics and Culture (5) I&S How people interpret and shape the political world around them through the use of such cultural resources as language, symbolism, myth, and ritual. The various uses of these cultural elements establish the place of the individual in society, influence the perception of political events, and create opportunities for individual and mass political responses. Prerequisite: junior or senior standing.

POL S 416 Economic Theory as Applied to the Political System (5) I&S Explanation and evaluation of the political system, using elementary economics theory. Topics include alternative voting rules, the political effectiveness of various types of groups, causes and consequences of logrolling, and bureaucratic organizations. Prerequisite: ECON 200 or 400 or equivalent. Offered: jointly with ECON 452.

POL S 417 Political Economy of India (5) I&S Relationships among processes of economic change, political institutions, and structures of political power in contemporary India. Contrasting approaches of Indian economic development, land reform, radical and agrarian political movements, and role of foreign aid. Offered: jointly with SISSA 417.

POL S 418 Multinationals and World Order (5) I&S Multinational corporations as a problem for world order. MNCs and the global political economy; theories of multinational activity; governance and regulation; international organizations, world politics, and MNCs. Prerequisites: introductory courses in international relations and international studies.

POL S 420 Foreign Relations of the Soviet Union (5) I&S Ideological, historical, and strategic components of Soviet foreign policy; Comintern, Cominform, and international communist movement; Soviet policy in foreign trade, in international law and organization, and in specific geographic areas.

POL S 421 Relations Among Communist States (5) I&S Major disputes and types of relationships among different communist states and ruling parties, attempts at integration and methods of alliance maintenance, tensions and contradictions in relations. Nature of the socialist commonwealth and the communist state system.

POL S 422 International Environmental Politics Seminar (5) I&S Study of the practical and theoretical challenges associated with global ecological interdependence. Examination of international treaties and institutions, state, and nonstate actors with an emphasis on the emerging concept of sustainability.

POL S 423 International Law (5) I&S Origin and present status of efforts to make rules of conduct for sovereign states; simulation of a treaty-drafting conference, with students playing roles of legal advisers to foreign governments. Recommended mainly for seniors with prior courses in international relations.

POL S 424 International Courts (5) I&S Earlier models, establishment, and operation to date of the World Court in the context of international law and politics; simulation of a court case, with students playing roles of judges and attorneys. Recommended mainly as a sequel to 423.

POL S 425 International Law Seminar (5) I&S Team research on a student-selected topic in international law; quantitative methods, computer applications, and writing skills. Prerequisite: 423 or 424 or permission of instructor.

POL S 426 World Politics (5) I&S The nation-state system and its alternatives, world distributions of preferences and power, structure of international authority, historical world societies and their politics. Offered: jointly with SIS 426.

POL S 427 International Political Economy (5) I&S Examines major theoretical problems, substantive issues, and school of thought in international political economy (IPE), including issues of trade, production, and finance. Preparation for critical analysis of dilemmas entailed in establishing and maintaining an instrumentally effective and ethically acceptable IPE system.

POL S 428 Military Intervention (5) I&S Historical and theoretical analysis of military intervention in the post-World War II era. Considers how and why interventions occur and evaluates intervention as a foreign-policy response.

POL S 431 International Relations in the Middle East (5) I&S Study of domestic sources of foreign policy in the Middle East; politics of oil; the East-West rivalry in the arena; and conflict and collaboration among the local powers.

POL S 432 Political Islam and Islamic Fundamentalism (5) I&S Study of resurgence, since mid-1970's of political Islam and what has come to be called Islamic fundamentalism, especially in the Middle East. Topics include the nature and variety of political Islam today, causes and implications of the current resurgence, and comparison with previous resurgences. Offered: jointly with SIS 406.

POL S 433 International Relations in Southeast Asia (5) I&S Analysis of the problems affecting relations among the countries of Southeast Asia. Prerequisites: 101, 343, or permission of instructor.

POL S 434 International Relations of South Asia (5) I&S Interrelationships of domestic, interstate, and extraregional forces and their effects upon the resolution or expansion of interstate conflicts in South Asia. Offered: jointly with SIS 434.

POL S 435 Japanese Government and Politics (5) I&S Government and politics of Japan with emphasis on the period since 1945.

POL S 436 Ethnic Politics and Nationalism in Multi-Ethnic Societies (5) I&S Provides a broad

theoretical base, both descriptive and analytical, for the comparative study of ethnicity and nationalism. Examples drawn from ethnic movements in different societies. Some previous exposure either to introductory courses in political science or to courses in ethnicity in other departments is desirable. Prerequisite: junior standing. Offered: jointly with SIS 436.

POL S 437 Politics in Scandinavia (5) I&S Twentieth-century politics in Scandinavia. How Scandinavian countries have been governed. Costs and consequences of their governmental style and its uncertain future. Optimal size of politics, problems of mature welfare states, process of leadership and representation in multiparty systems, decline of political parties. Offered: jointly with SCAND 437.

POL S 438 Politics in France (5) I&S Study of contemporary France. Structures of government in the Fifth Republic; nature of French voting behavior and evolution of the bipolarized political party system; behavior of political interest groups; training of France's administrative elite and functioning of the state bureaucracy; dynamics of policy-making.

POL S 439 Politics of Korea (5) I&S Korean politics in the twentieth century, treating political legacy of ancient regime, colonial period, Korean War, and the politics of North and South Korea. Comparative treatment of both Koreas in light of the Chinese and Japanese experience. Includes the America-Korea relationship. Offered: jointly with SISEA 439.

POL S 440 European Fascism (5) I&S Analysis of fascism as revolutionary movement and type of political system in post-World War I Europe: Hitler's Third Reich, Mussolini's Italy, and Vichy France. Consideration of dynamics of resistance, policies that produced Holocaust, and questions raised at trials of fascist leaders in Nuremberg and elsewhere. Prerequisite: permission of instructor.

POL S 441 Government and Politics of the Soviet Union (5) I&S Ideological and historical bases of Soviet politics, Leninism-Stalinism, Communist Party structure and functions, administrative agencies, the police and military, law and the judiciary, Soviet federalism and nationality policy.

POL S 442 Government and Politics of China (5) I&S Post-1949 government and politics, with emphasis on problems of political change in modern China. Prerequisite: junior standing. Offered: jointly with SISEA 449.

POL S 443 Comparative Political Societies (5) I&S Analyses of modern and premodern types of stable political society; special attention to contemporary representative democracy.

POL S 444 Revolutionary Regimes (5) I&S Analysis of the several types of political regimes concerned with effecting fundamental social change; emphasis on the twentieth century.

POL S 445 Politics and Society in Eastern Europe (5) I&S Political and social issues in lands east of the Elbe, treating some historical problems but focusing particularly on developments since 1945. Includes all communist states of Eastern Europe and their successors. Prerequisite: one previous course in European politics or history. Offered: jointly with SISRE 445.

POL S 446 Peasants in Politics (5) I&S Interdisciplinary study of peasants, with special attention to questions of rural transformation. Peasant involvement in an increasingly interdependent world. Rebellion and revolution, impact of the international market, agricultural development. Offered: jointly with SIS 444.

POL S 447 Comparative Politics Seminar (5, max. 10) I&S Selected comparative political problems, political institutions, processes, and issues in comparative perspective. Strongly recommended: 204.

POL S 448 Politics of the European Community (5) I&S Examines the origins, structures, and political

dynamics of the European Community. Attention given to theories of integration, to relations between the European Community and member states, and to the role of the European Community in world politics.

POL S 449 Politics of Developing Areas (5) I&S Comparative study of problems of national integration and political development in the new states of Asia and Africa. Prerequisite: junior standing.

POL S 450 State-Society Relations in Third World Countries (5) I&S Relationships among political, social, and economic changes in Asia, Africa, and Latin America: Problems of economic and political development, revolution and reform, state-society relations, imperialism and dependency. Offered: jointly with SIS 456.

POL S 452 Political Processes and Public Opinion in the United States (5) I&S The foundations and environment of opinion; organization and implementation of opinion in controlling government and public opinion as a force in the development of public policy; public relations activities of government agencies.

POL S 453 The State Legislature (5) I&S Study of American state legislatures, with special reference to Washington State Legislature. Student must spend several Fridays in Olympia when the legislature is in session. Those desiring a more extensive involvement with the legislature should enroll in the political internship. Prerequisites: upper-division standing and permission of instructor.

POL S 462 The Supreme Court in American Politics (5) I&S Introductory public law course that examines the interplay of constitutional law and American politics with particular attention to the role of the Supreme Court in the formulation and implementation of public policy in such matters as criminal-law enforcement, civil rights political expression, and economic regulation.

POL S 483 Political Analysis of United States Social Programs (5) I&S Social problems in the United States and policy responses. National policies concerning poverty, health, welfare, manpower, and the Social Security system. Examination of subgovernments that cluster around each policy area.

POL S 484 The Politics of American Criminal Justice (5) I&S Political forces and value choices associated with the enforcement of criminal law. Distribution of resources among participants in the criminal justice system (e.g., police, attorneys, defendants, and judges). Understanding and evaluation of the interaction of criminal justice processes with the political system. Prerequisite: junior or senior standing.

POL S 485 Law and Public Policy in the United States (5) I&S Relationship between law and public policy, with particular attention to problems of social, economic, and political change. Considers legal and constitutional processes as they relate to such problems of public policy as race relations, the environment, and the economy. Prerequisite: junior or senior standing.

POL S 486 Feminist Legal Studies: Theory and Practice (5) I&S Examines feminist theoretical analyses of the law. Engages in current debate on the study of critical race, gender, and class theory. Includes: women in prison, public assistance, the sex industry, women and health care, and immigration law. Prerequisites: WOMEN 200, one upper division women studies course, or permission of instructor. Offered: jointly with SO JUMWOMEN 410.

POL S 487 Comparative Law in Society (5) I&S Legal systems around the world as they actually work in their respective political, social, and economic contexts. Emergence and development of European legal systems, legal customs at variance with those of Europe, problems of legal processes in the modern state.

POL S 470 Public Bureaucracies in the American Political Order (5) I&S Growth, power, and roles of

governmental bureaucracies in America: conflict and conformity with American political thought, other political institutions, and the public.

POL S 474 Government and the Economy (5) I&S Interaction between politics and the economy. Impact of policy makers on economic performance. Models of partisan and political business cycles. Concepts of economic voting. Marxist theories of modern capitalist economics. Prerequisite: ECON 201. Recommended: MATH 124.

POL S 475 Public Choice (5) I&S Problems and prospects for collective action in a political democracy. Designing rules and institutions for effective central authority and effective constraints on governmental power. Social choice theory and game theory. Prerequisite: 270 or 474.

POL S 476 Strategy in Politics (5) I&S Explores the problem of finding fair methods for making social decisions, and examines alternative methods of social choice. Emphasis on the importance of agenda control for outcomes, and the implications of theories of social choice for common interpretations of concepts such as democracy and the general will. Prerequisite: 202 or 270.

POL S 481 Big City Politics (5) I&S Contemporary big city politics, focusing on Seattle and the largest twenty-five cities. Social, economic, and political trends that have shaped characteristics of large American cities. Distribution and use of economic and political power among parties and groups. Future of large cities and politics of change. Recommended: 202.

POL S 485 Urban Politics Seminar (5) I&S Advanced undergraduate course in urban politics. Opportunity for more independent and intensive analysis of particular problems or lines of inquiry. Prerequisites: 101 or 202 and 481.

POL S 488-489 Honors Senior Thesis (5-5) I&S Students individually arrange for independent study of selected topics under the direction of a faculty member. Research paper is student's senior thesis. Students meet periodically as a group to discuss research in progress. Prerequisites: 15 credits in 398, senior honors standing, and permission of instructor.

POL S 490 Foundations of Political Analysis (5) I&S Fundamental issues pertaining to research in political science: "logics of inquiry," problems of concept formation, and development of research methods. Positivist, postempiricist, and other arguments about the nature of scientific knowledge.

POL S 491 Political Research Design and Analysis (5) I&S Major quantitative methods of empirical research in political science. Primary emphasis on research design, data collection, data analysis, and use of computers. Prerequisite: 290 or equivalent or graduate standing or permission of instructor.

POL S 492 Advanced Political Research Design and Analysis (5) I&S Third methods course in political research. Testing theories with empirical evidence. Examines current topics in research methods and statistical analysis in political science. Content varies according to recent developments in the field and with interests of instructor. Recommended: 490, 491.

POL S 493 Language and Politics (5) I&S Language as a political phenomenon, a tool of political power, and a source of political problems. Includes the effects of "public doublespeak," the role of language in racism and sexism, and the search for ways to overcome national and international language barriers in several parts of the world. Primarily for students in political science, languages, and area studies. Prerequisite: permission of instructor.

POL S 495 Study Abroad—Political Science (3-5, max. 15) I&S For participants in the study abroad program. Specific course content determined by assigned faculty member and announced in study

abroad bulletin. Politics, political culture, and institutions related to their national setting.

POL S 496 Undergraduate Internship (5, max. 15) Students serving in approved internships. Prerequisites: sophomore standing or above and permission of undergraduate adviser.

POL S 497 Political Internship in State Government (5, max. 20) Students serving in approved internship program with state government agencies. Prerequisites: junior standing or above and permission of undergraduate adviser.

POL S 498 The Washington Center Internship (15) Full-time academic internship with the Washington Center in Washington, DC Includes internship activities, academic seminar, assemblies, and related activities. Credit/no credit only. Prerequisites: 202, junior standing or above; one year at this university; application and acceptance into program; permission of undergraduate adviser.

POL S 499 Individual Conference and Research (2-5, max. 20) Intensive study with faculty supervision. No more than one registration in 499 under same instructor. Prerequisites: junior or higher standing and permission of undergraduate adviser.

Courses for Graduates Only

POL S 501 Survey of American Government (3) Conceptual perspectives toward American government. Alternative ways of considering policy issues. Focuses on such models as legal-constitutional, pluralistic competition, political economy, public interest, and conflict resolution. For graduate students outside political science.

POL S 505 Comparative Politics (5) Core course. Modern theories, approaches, and methods in the study of comparative politics.

POL S 509 Philosophical Political Theory (5) One of two political theory core courses. Introduction to the works of major political theorists, past and present. Enduring controversies in political thought and on contemporary political theory literature.

POL S 510 Analytical Political Theory (5) One of two political theory core courses. Reasoned argument as a tool of normative and explanatory political enquiry in Aristotelian, Contractarian, Marlin, ordinary-language, public choice, and other traditions. Analytical approach to theories of justice, freedom, obligation, cooperation, the state and other fundamental political problems.

POL S 511 Seminar in Ethical and Political Theory (5) Ethical writings of major political philosophers. Coherent themes arising from these works and assessment of their impact on concepts of politics. Recommended: background in political philosophy.

POL S 512 Seminar in Nationalism and Political Theory (3) Nationalism, republics, impact of mass democracy. Growth of internationalism. Role of political philosophy in probing institutions, moral perspectives, and assessing significance of nation-state, international order.

POL S 513 Issues in Feminist Theory (5) Contemporary issues in feminist theory as they affect studies of women, politics, and society.

POL S 514 Selected Topics in Political Theory (3-5) Selected topics, historical and conceptual, national, regional, and universal. Prerequisite: permission of instructor.

POL S 515 Scope and Methods in Political Science (5)

POL S 516 Special Topics in American Political Thought (3/5) Special topics or themes in the development of American political culture.

POL S 517 Marxism and Critical Theory (5) Works of Marx and Engels as well as selected works of twentieth-century Marxist and critical theorists. Themes such as Marx's method, twentieth-century interpretations of Marx, and relationship of twentieth-century theorists to their eighteenth- and nineteenth-century forebears.

POL S 519 Modern Scandinavian Politics (5) Analyzes the political, economic, and historical development of Sweden, Norway, Denmark, Iceland, and Finland from World War II to the present. Readings focus on domestic and foreign policies that distinguish these countries from other advanced industrial societies. Offered: jointly with SCAND 519.

POL S 520 Seminar on the Foreign Policy of the Soviet Union (3) Selected topics in the development, methods, and objectives of the foreign policy of the Soviet Union. Prerequisite: permission of instructor.

POL S 521 International Relations I: Theory and Method (5) Part one of the core course in the field of international relations. Reviews contemporary theory, research, and methodology in the study of world politics.

POL S 522 International Political Economy (3-6) Theories of international political economy. Focuses on the emergence and development of the modern world system, the transition from feudalism to capitalism, and the institution of the nation-state system. Also examines the political economy of trade, investment, and the international division of labor from a variety of theoretical perspectives. Prerequisite: 521.

POL S 523 World System Analysis (4) Evolution of the world system. Historical-structural approaches to world politics: neo-realism; long cycles; world economy. Prerequisite: 521.

POL S 525 International Law—Policy (3) Inputs of international law into the decisional process in foreign policy. Effect of policy on law. Relevant roles of individuals and institutions in routine and crisis situations. Prerequisite: 423 or permission of instructor.

POL S 527 Special Topics in International Relations Research (3, max. 9) Examination of current topics in the theory and practice of world politics. Content varies according to recent developments in the field and research interests of the instructor.

POL S 528 Advanced International Relations Theory (5) Covers advanced works in international relations theory. e.g., realism, neorealism, game theory, and theories of cooperation and conflict. Includes some classic works (Thucydides, Hobbes, E. H. Carr) to show continuity of debates in the present. Modern theories of war, conflict, cooperation, and international institutions also explored. Prerequisite: 521.

POL S 529 Problems of American Foreign Policy (3) Critical analysis of the historical foundations and contemporary problems of foreign-policy making, with attention given to selected foreign-policy decisions. Prerequisite: 321 or permission of instructor.

POL S 532 The Chinese Political System (3) Examination of key approaches, interpretations, and secondary literature in the study of contemporary Chinese politics. Prerequisite: permission of instructor. Offered: jointly with SISEA 532.

POL S 533 Seminar on Contemporary Chinese Politics (3) Research on selected problems in contemporary Chinese politics. Prerequisite: 532 or permission of instructor. Offered: jointly with SISEA 533.

POL S 534 International Affairs (3) Provides a broad understanding of international issues and United States policy. Students explore US foreign policy and theories of major international actors in international trade, security, and strategic concerns, refugee policy, conflict resolution, development assistance, and the environment. Offered: jointly with PB AF 534/SIS 534.

POL S 535 International Relations of Modern China (3-5) Foreign policy of the People's Republic of China: historical antecedents; domestic and international systemic determinants; and Chinese policies toward major states, regions, and issues. Prerequisite: a course on contemporary Chinese politics or history, or permission of instructor. Offered: jointly with SISEA 535.

POL S 536 Ethnic Politics and Nationality Formation (3) Seminar on analysis and theoretical understanding of two interrelated processes: ethnic group persistence and change over time; and the transformation of ethnic groups into politically self-conscious and influential nationalities. The readings and discussions deal with these two processes in the contexts of both developing societies and advanced industrial societies.

POL S 537 Approaches to East European Politics (3-6) Selected concepts and methodologies useful for the analysis of politics and social structure in the socialist countries of east-central and southeastern Europe. Prerequisite: permission of instructor. Offered: jointly with SISRE 504; alternate years.

POL S 538 Government and Politics in the Middle East and North Africa (3) Political change in the area within the context of comparative politics; breakdown of traditional political systems; new range of choice expressed in competing ideologies; governmental and nongovernmental instrumentation of change; and problems of international relations and regional conflict and integration.

POL S 540 Problems in South Asian Politics (3) Research problems in contemporary Indian politics.

POL S 541 The Soviet Political System (4) Critical appraisal of the principal research methods, theories, and types of literature dealing with the government and politics of the Soviet Union. Prerequisite: permission of instructor.

POL S 542 Seminar: State and Society (5) Examines the mutually conditioning relationship between states and the societies they seek to govern. Studies states as large, complex organizations and their interactions with society on different levels. Shows that interactions on any level affect the nature of the state on other levels as well. Offered: jointly with SIS 542.

POL S 544 Problems in Comparative Government (3, max. 9) Selected problems in the comparative analysis of political institutions, organizations, and systems.

POL S 545 Seminar on Japanese Government and Diplomacy (3, max. 8)

POL S 546 Seminar on Problems of Soviet Politics (3) Selected problems of Soviet domestic politics. Prerequisite: 541 or permission of instructor.

POL S 547 Politics of Reform (3) Examines cases of reform in democratic political systems, e.g., Roosevelt's New Deal, Allende's Chilean "revolution", Mitterrand's socialist experiment in France, and the Thatcher government in Britain.

POL S 548 Comparative Political Parties (3) Role of political parties in the modern state. Similarities and differences in origins and development of political parties and functions they perform, both in established democracies and in developing countries.

POL S 549 Problems of Political Development (5) Concepts of development and modernization, with particular attention to their political dimensions and their application to various historical and contemporary cases.

POL S 550 American Politics—Core (5) Core course in American government and politics. Systematic survey of the literature; focuses on national politics. Prerequisites: undergraduate courses in American government and politics.

POL S 553 Public Opinion (3) Selected problems in opinion formation, characteristics, and role of public opinion in policy-making process. Prerequisite: 452.

POL S 554 Legislative Politics (3, max. 6) Selected problems in legislative processes and leadership, state and national.

POL S 561 Law and Politics (5) Points and levels at which law and politics intersect. What is distinctive about legal forms; how these legal forms influence, and are influenced by, politics. Conceptions of law, courts and public policy, law and bureaucracy, civil and criminal justice, and the legal profession.

POL S 562, 563, 564 Public Law (3, 3, 3) Constitutional and legal concepts governing governmental authority and institutions and the conduct of governmental activities.

POL S 566 Problems in Comparative Legal Institutions (3) Social science inquiry in comparative legal institutions. Worldwide scope, with attention to both theory of law in society and development and practice of legal institutions.

POL S 567 Public Policy, Administration, and Political Theory (3) Meaning of democracy in the context of American public policies and administration. Perspective of individual and group participation in the policy process, individual's role in organizations, functions of the public servant in the making of policy decisions, and realities of policy formulation in relation to political values. Offered: jointly with PB AF 556.

POL S 570 Bureaucratic Politics (3) Emerging literature on bureaucratic politics (e.g., principal-agent theories) and its relevance to policy processes at national or subnational levels. Offered: jointly with PB AF 501.

POL S 572 Administrative and Executive Leadership (3) Nature of executive life in the public sector, the function of leadership in implementing, making, and changing policy. Leadership styles, the relation of leadership to its constituencies and communities. Offered: jointly with PB AF 503.

POL S 573 Topics in Public Policy (3-6, max. 10) Specialized research topics with a policy process or related theoretical content.

POL S 575 Public Policy Processes (5) Political science frameworks, approaches, and theories concerning development and implementation of public policies within American political systems. Governmental behaviors and processes, including rational, political, and bureaucratic models of governmental decision making; agenda-building processes; and normative perspectives concerning role of governmental entities. Offered: jointly with PB AF 575.

POL S 576 Political Culture (5) Values, beliefs, and rituals that guide political action in society. Some approaches emphasize symbolic sphere of value and belief over material conditions of power and economic production. Other approaches emphasize material relations. Reconciliation of symbolic and materialist approaches that explain intervention of the modern state in cultural processes.

POL S 577 The Politics of Social Movements (3-5) Theoretical inquiry directed to questions of collective action and political tactics by social movement groups. Case studies include labor, civil rights, women's, environmental, and other movements in twentieth-century United States.

POL S 581 Politics of Economic Policy Making (4) Determinants of American economic policy with particular attention paid to competing theories of government growth, to political business cycle theory, to incrementalist and other budgetary theories, to effects of party control, and to theories of class control. Interrelationships of monetary, tax, and expenditure policies.

POL S 582 The Political Economy of Social Change (3/5) Social change and property rights theory. Exploration of long-term secular change through works whose approaches derive from neo-classical economics and analytical Marxism. Evolution and transformation of property rights over land, labor, and capital and the consequences of the property rights structure for political and economic institutions.

POL S 583 Economic Theories of Politics (3-5) Problems of public goods provision and collective action. Collective action theories and applications as well as critical review of the concept of rationality.

POL S 584 Approaches to Subnational Government (3) Analysis of current approaches and concepts in the study of subnational government—urban, state, and regional public organization.

POL S 587 Politics of Urban Reform (3) Interpretations of urban reformers at turn of this century and during 1960s and 1970s. Historical and political science literature on the subject. Prerequisites: graduate student standing and permission of instructor.

POL S 589 Special Topics in Political Economy (3, max. 9) Evaluating research in political economy as well as developing research problems. Topics vary with instructor and with current problems in the literature. Prerequisites: 406, 416, ECON 400, and permission of instructor.

POL S 590 Seminar in Political Behavior (3, max. 6) Analysis of behavioral research in selected fields of political science.

POL S 593 Theories of Decision Making (5) Explanation of political decisions using models of such theoretical processes as preference formation, learning, heuristics, noncooperative games, collective action, agenda manipulation, and coalition formation. Examination of competing notions of political rationality and irrationality and criteria for their evaluation. Strategies for design of decision research. Prerequisite: 491 or permission of instructor.

POL S 595 College Teaching of Political Science (1)

POL S 597 Directed Readings (* max. 9) Intensive reading in the literatures of political science, directed by the chair of the doctoral supervisory committee. Credit/no credit only.

POL S 598 Independent Writing I (3-5) Supervised research and writing for graduate students completing the MA essay of distinction.

POL S 599 Independent Writing II (3-5) Supervised research and writing for graduate students completing the Ph.D. essay of distinction.

POL S 600 Independent Study or Research (*)

POL S 700 Master's Thesis (*)

POL S 800 Doctoral Dissertation (*)

Psychology

119 Guthrie

Psychology involves the scientific study of behavior and its causes and the understanding of human behavior in a variety of settings. Psychology is studied either as a natural science, which stresses physical and biological causes of behavior, or as a social science, which stresses the effects of the social setting on human behavior. Major areas of emphasis are human cognition, animal behavior, physiological and sensory bases of behavior, quantitative techniques, personality and clinical psychology, developmental psychology, and social psychology. The department does not have formal programs in educational, school, or counseling psychology (see the College of Education section of

this catalog), engineering psychology, or industrial psychology.

Undergraduate Program

Advisers
114 Guthrie
Box 351525
email: psyadvise@u.washington.edu

Admission Requirements: (1) One English composition course completed; (2) MATH 111, or 112, or 120, or 124 completed; (3) the following psychology courses completed: 101 or 102; 209; one core course from 200, 222, 333, or equivalent; one course from 205, 305, 306, 345, 355, or equivalent; (4) minimum 2.50 GPA in all psychology courses listed in (3), with a minimum grade of 2.0 in each psychology course; (5) minimum 2.00 UW cumulative GPA.

Admission is competitive. Meeting the above criteria does not guarantee admission to the department. The Admissions Committee reviews all applicants based on the following criteria: preparation for a major in psychology as indicated by grades earned in courses required for admission; GPA; personal statement reflecting an interest in and commitment to psychology; and other evidence of a commitment to becoming a psychology major.

The application deadline is the first Friday of autumn, winter, and spring quarters. Applications and additional information are available in 114 Guthrie.

Bachelor of Science

The Bachelor of Science program is intended to prepare students for doctoral programs in psychology, leading to careers in teaching, research, or clinical psychology. It may also provide desirable preparation for some health-related professions. The program emphasizes laboratory/research experience, a strong background in related fields and mathematics, and requires a 3.30 psychology GPA.

Major Requirements: 60 credits in psychology courses—101 or 102; 209; 217 and 218; 231 or 361; one course from 232, 233, 417, 418, or 419; one course from 200, 222, or 333; one course from 205 or 305; one course from 306, 345, or 355; 3 credits minimum of 499; three graded upper-division elective courses (excluding 496 through 499) with at least one course at the 400-level; and additional psychology electives at the 200 level or above to total 60 credits (9 credits maximum for 496 through 499). 30 credits in other disciplines, to include MATH 120 and 124, or 111 and 112; 5 credits of biology, zoology, or genetics; and 15 additional credits selected from computer science, upper-division biology, zoology, genetics, sociology, anthropology, political science, women studies, ethnic studies, speech communications, and adviser-approved departments. 3.00 cumulative GPA in courses completed at the UW and 3.30 GPA in all psychology courses (UW and transfer), with a minimum grade of 2.0 in each course presented for the major. Transfer students must meet all the above requirements and are required to complete at least 15 graded credits in psychology at the 300 and 400 level at the UW.

Bachelor of Science—Speech and Hearing Sciences Concentration

The Bachelor of Science with speech and hearing sciences concentration represents an interdisciplinary introduction to the study of sensory, perceptual, and cognitive sciences. It provides a basic foundation in the scientific study of behavior with an emphasis on human speech, language, and hearing.

Major requirements: 60 credits in psychology and speech and hearing sciences concentration courses—PSYCH 101 or 102; 209; 217 and 218; 200 or 222 or 333; 205 or 305; 306 or 345 or 355; PSYCH 231 or 232 or 233 or 361 or 417 or 418 or 419; SPHSC 310

or 311; PSYCH 496 through 499 or SPHSC 499 (9 credits maximum); 15 graded credits from the following with minimum two courses from SPHSC: PSYCH 347, 416, 447, 457; SPHSC 307, 401, 410, 411, 416, 310 or 311 (depending on laboratory selection). Required related fields: 30 credits in other disciplines, to include MATH 120 and 124, or 111 and 112; 5 credits in biological sciences; and 15 credits from computer science, upper-division biology, zoology, genetics, anthropology, or linguistics. 3.00 cumulative GPA in courses completed at the UW and 3.30 GPA in psychology and speech and hearing sciences courses, excluding courses numbered 496 through 499 (UW and transfer), with a minimum grade of 2.0 in each course presented for the major. Transfer students must meet all the above requirements and are required to complete at least 15 graded credits of psychology and speech and hearing sciences electives at the 300 and 400 level at the UW.

Bachelor of Arts

The Bachelor of Arts program is intended to provide a general background in psychology for students seeking employment at the baccalaureate level, wanting to apply the principles of psychology in other disciplines, or preparing for many master's-level graduate programs.

Major requirements: 50 credits in psychology courses—101 or 102; 209; 213 (or 217 and 218); one lab course from 231, 232, 233, 361, 417, 418, or 419; one course from 200, 222 or 333; one course from 205, 305, 306, 345, or 355; one additional course from 200, 205, 222, 305, 306, 333, 345, or 355; three graded upper-division elective courses (excluding 496 through 499) with at least one course at the 400 level; additional psychology electives at the 200 level or above to total 50 credits (6 credits maximum for 496 through 499); and MATH 111 or 112 or 120 or 124; 2.00 cumulative GPA in all courses completed at the UW; 2.50 cumulative GPA in all psychology courses (UW and transfer), with a minimum grade of 2.0 in each course presented for the major. Transfer students must meet all the above requirements and are required to complete at least 15 graded credits in psychology at the 300 and 400 level at the UW.

A student may earn either a Bachelor of Science or a Bachelor of Arts degree in psychology, but not both.

Graduate Program

Graduate work in psychology is organized primarily as preparation for the Doctor of Philosophy degree. The optional Master of Science degree is taken by some doctoral students in the course of their work toward the doctorate.

For graduate instruction, the department is organized into six major areas of study: animal behavior, adult and child clinical, cognition and perception, developmental, physiological, and social psychology and personality. Specializations also exist in the subareas of community, health, law, sport, and quantitative psychology.

The program in clinical psychology is accredited by the American Psychological Association and provides scientific and professional training.

The Behavioral Neuroscience Interdisciplinary Group of the Graduate School, composed of faculty from the departments of Psychology and of Physiology and Biophysics, offers an interdisciplinary program leading to the Doctor of Philosophy degree in behavioral neuroscience.

Admissions Qualifications

Undergraduate degree in psychology is desirable, but not required. Some preparation in biological, social, or quantitative sciences is strongly advised. Applicants are judged on a number of criteria, including their

academic and research backgrounds, Graduate Record Examination scores, and written evaluations submitted by former professors or supervisors. Students with little training in psychology may be required to complete preliminary work in undergraduate courses. Admission of new students occurs in autumn quarter. The deadline for receipt of admissions material is December 31.

Master of Science (Optional)

A master's degree *only* program is not available. Doctoral students have the option of obtaining a master's degree while working toward the Ph.D.

Graduation Requirements: Completion of first-year graduate program (see Doctor of Philosophy degree requirements below) and an appropriate research program, including a research thesis.

Doctor of Philosophy

Graduation Requirements: Completion of course work in major and minor areas and breadth requirements in two other areas; completion of required course work in statistics and general methodology; independent research; General Examination; dissertation; Final Examination. Minimum 3.00 GPA overall must be maintained; 3.0 grade required for all courses used to satisfy breadth and minor requirements. *First-year requirements:* Demonstrate competence in statistics and experimental design; complete at least 3 credits of independent predoctoral research and report that research at the department's annual Research Festival.

Special Research Facilities

Facilities for research and graduate instruction include: teaching laboratories; machine, electronic, and carpentry shops; microprocessor room; animal vivarium; darkroom; remote-access console to computer center; and approximately 60 small, specialized laboratory research rooms.

Assistantships, Fellowships, or Traineeship Opportunities

Research and teaching assistantships are available to qualified graduate students. Additional traineeships and fellowships are also available.

Correspondence and Information

Graduate Program Coordinator
127 Guthrie, Box 351525

Faculty

Chair

Michael D. Beecher

Professors

Barash, David P. * 1973; MA, 1968, PhD, 1970, University of Wisconsin; sociobiology, psychological aspects of nuclear war, peace studies, animal behavior and evolution.

Barnard, Kathryn E. * 1972, (Adjunct); MS, 1962, Boston University; PhD, 1972, University of Washington; ecological factors of child development.

Becker, Joseph * 1965, (Emeritus); PhD, 1958, Duke University; clinical personality psychopathology.

Beecher, Michael D. * 1978; MA, 1965, PhD, 1970, Boston University; animal communication, animal behavior, sensory processes.

Bernstein, Ilene L. * 1978; MA, 1967, Columbia University; PhD, 1972, University of California (Los Angeles); behavioral neuroscience, mechanisms affecting appetite and taste preference.

Booth, Cathryn L. * 1980, (Adjunct Research); PhD, 1974, Ohio State University; mother-infant interaction,

- observational methodology, child birth experiences and attachment.
- Butterfield, Earl C. * 1981, (Adjunct); PhD, 1963, George Peabody College; cognitive development, metacognition.
- Carr, John E. * 1963; PhD, 1963, Syracuse University; clinical psychology, cross-cultural psychopathology.
- Cauce, Ana Mari * 1986; PhD, 1984, Yale University; social support and networks, at-risk adolescents, community psychology, minority populations.
- Chapman, C. Richard * 1971, (Adjunct); PhD, 1969, University of Denver; human pain measurement, psychophysiology, sensation and perception, chronic pain.
- Curry, Susan J. * 1985, (Adjunct); MA, 1979, PhD, 1981, University of New Hampshire; health behavior change.
- Dale, Philip S. * 1968; PhD, 1968, University of Michigan; psycholinguistics, language and cognitive development in normal and exceptional children.
- Dawson, Geraldine * 1985; PhD, 1979, University of Washington; developmental disabilities, autism, and neuropsychology.
- Diaz, Jaime * 1978; PhD, 1975, University of California (Los Angeles); brain development, developmental psychopharmacology, neuropsychology.
- Doerr, Hans O. * 1967, (Emeritus); PhD, 1965, Florida State University; psychophysiology of central and autonomic nervous systems, neuropsychology.
- Donovan, Dennis 1981, (Adjunct); MA, 1972, Western Washington University; PhD, 1980, University of Washington; cognitive-behavioral factors in substance abuse and addictive behaviors.
- Fiedler, Fred E. * 1969, (Emeritus); PhD, 1949, University of Chicago; leadership and group effectiveness, social, industrial, and organizational psychology.
- Fields, Paul E. 1953, (Emeritus); MA, 1927, Ohio Wesleyan; PhD, 1930, Ohio State University; teaching of psychology, psychology examinations.
- Fuchs, Albert F. * 1969, (Adjunct); PhD, 1966, Johns Hopkins University; oculomotor physiology.
- Gist, Marilyn Elaine * 1987, (Adjunct); PhD, 1985, University of Maryland; cognitive processes involved in motivation training and work task performance.
- Gottman, John M. * 1986; PhD, 1971, University of Wisconsin; development of children's friendships, marriage and family, observational research techniques.
- Greenberg, Mark T. * 1977; PhD, 1978, University of Virginia; developmental psychopathology, prevention of mental disorders in childhood.
- Greenwald, Anthony G. * 1986; PhD, 1963, Harvard University; social cognition, attitudes, self and self-esteem, methodology, unconscious cognition.
- Guralnick, Michael J. 1986; MS, 1964, PhD, 1967, Lehigh University; developmental disabilities, peer relations, social and language development, evaluation systems.
- Heiman, Julia R. * 1980, (Adjunct); PhD, 1975, State University of New York (Stony Brook); sexuality and sexual relationships, prevention and treatment of family abuse.
- Horst, A. Paul 1947, (Emeritus); PhD, 1931, University of Chicago; prediction of personal adjustment, factor analysis, measurement techniques.
- Hunt, Earl B. * 1966; PhD, 1960, Yale University; individual differences in cognition, cognition in education and the workplace.
- Jacobson, Neil S. * 1979; PhD, 1977, University of North Carolina; behavior marital therapy, depression, family therapy.
- Keating, John P. * 1972, (Affiliate); PhD, 1972, Ohio State University; social psychology, media effect on attitude, psychology and religion, emergency behavior psychology.
- Kiyak, H. Asuman * 1972, (Adjunct); MA, 1974, PhD, 1977, Wayne State University; geriatric dentistry, behavioral aspects of health care.
- Kuhl, Patricia K. * 1976, (Adjunct); MA, 1971, PhD, 1973, University of Minnesota; speech perception.
- Linehan, Marsha M. * 1977; PhD, 1971, Loyola University (Chicago); personality disorders, including borderline; suicidal behaviors, cognitive and behavior therapies.
- Lockard, Joan S. * 1974; PhD, 1963, University of Wisconsin; primate social behavior, animal behavior, sociobiology, human ethology, neurobehavior.
- Loftus, Elizabeth F. * 1973; PhD, 1970, Stanford University; cognition, long-term memory, eye-witness testimony, psychology and law.
- Loftus, Geoffrey R. * 1972; PhD, 1971, Stanford University; perception, cognitive processes and information processing, computer control of experimentation.
- Lunneborg, Clifford E. * 1962, (Emeritus); PhD, 1959, University of Washington; psychometrics, multivariate models, individual differences in cognition.
- Marlatt, G. Alan * 1972; PhD, 1968, Indiana University; health psychology and addictive behaviors (relapse prevention and harm reduction).
- Martin, Joan C. * 1972, (Adjunct); PhD, 1965, Florida State University.
- Meltzoff, Andrew N. * 1984; PhD, 1976, Oxford University (UK); cognitive and social development of human infants.
- Mitchell, Terence R. * 1969; PhD, 1969, University of Illinois; organizational behavior.
- Robinson, Nancy M. * 1969, (Adjunct); PhD, 1958, Stanford University; psychology.
- Rubel, Edwin W. * 1986, (Adjunct); PhD, 1969, Michigan State University; developmental neurobiology, with special emphasis on vertebrate auditory system development.
- Sackett, Gene P. * 1970; PhD, 1963, Claremont Graduate School; primate behavior, early experience and development.
- Sarason, Barbara R. * 1976, (Research); PhD, 1956, Indiana University; social support, stress, anxiety, cognitive coping skills, personality variables.
- Sarason, Irwin G. * 1956; PhD, 1955, Indiana University; personality, social support, stress and anxiety.
- Sax, Gilbert * 1965, (Emeritus); PhD, 1958, University of Southern California; measurement, statistics and research design.
- Simpson, John B. * 1975; MA, 1972, PhD, 1973, Northwestern University; central autonomic regulation, body fluid homeostasis, behavioral endocrinology.
- Smith, Ronald E. * 1969; PhD, 1968, Southern Illinois University; clinical psychology, personality, stress and coping, sport psychology.
- Smoll, Frank L. * 1984; PhD, 1970, University of Wisconsin; sport psychology, leadership behavior in youth sports, psychological correlates of motor development.
- Streissguth, Ann P. 1972, (Adjunct); MA, 1959, University of California (Berkeley); PhD, 1964, University of Washington; psychology.
- Strother, Charles R. 1947, (Emeritus); MA, 1932, University of Washington; PhD, 1935, University of Iowa; mental retardation, psychopathology, speech pathology.
- Teller, Davida Y. * 1965; PhD, 1965, University of California (Berkeley); vision, color vision, development of vision in infants.
- Teri, Linda 1984, (Adjunct); PhD, 1980, University of Vermont; clinical psychology.
- Townes, Brenda D. * 1961, (Adjunct); PhD, 1970, University of Washington; psychology.
- Vitaliano, Peter P. * 1978, (Adjunct); PhD, 1975, Syracuse University.
- Woods, Stephen C. * 1972; PhD, 1970, University of Washington; physiological psychology, regulatory behavior, conditioned drug effects.

Associate Professors

- Armstrong, Hubert E. 1966, (Adjunct); PhD, 1963, Syracuse University; clinical psychology.
- Baer, John S. * 1986, (Research); PhD, 1986, University of Oregon; clinical psychology, addictive behaviors, early intervention.
- Bell, Cecil H. Jr. * 1968, (Adjunct); MA, 1959, PhD, 1970, Boston University; organizational behavior and administrative theory.
- Bowen, Deborah J. * 1986, (Affiliate); PhD, 1986, Uniformed Services University of the Health Sciences; health psychology.
- Brenowitz, Eliot A. * 1987; PhD, 1982, Cornell University; animal behavior, neuroethology, neuroendocrinology, animal communication.
- Broedel, John W. * 1967, (Emeritus); EdD, 1958, University of Illinois; counseling, early adulthood, object relationship theory.
- Brown, Jonathon D. * 1989; PhD, 1986, University of California (Los Angeles); self-concept and social behavior; stress and physical health.
- Buck, Steven L. * 1983; PhD, 1976, University of California (San Diego); human visual psychophysics, perception, human and animal learning.
- Burns, Edward M. * 1984, (Adjunct); PhD, 1977, University of Minnesota; psychoacoustics.
- Clatterbaugh, Kenneth C. * 1966, (Adjunct); PhD, 1966, Indiana University; philosophy of science, modern philosophy, social philosophy.
- Craft, Suzanne 1996 (Adjunct Research); PhD 1985, University of Texas (Austin).
- Culbert, Sidney S. * 1951, (Emeritus); PhD, 1950, University of Washington; perception, psycholinguistics, intercultural communication.
- Douglas, Robert J. * 1968; PhD, 1964, University of Michigan; neuropsychology of learning and memory, aging and inhibition.
- Filts, Douglas A. * 1981, (Research); PhD, 1978, Washington State University; neurobiology, salt/water regulation, thirst.
- George, William H. * 1991; PhD, 1982, University of Washington; alcohol effects on social/sexual behavior, treatment and cultural issues in addiction.
- Gillmore, Gerald M. * 1973, (Affiliate); PhD, 1970, Michigan State University; measurement theory, assessment of student performance, program evaluation.
- Gonzalez, Richard D. * 1990; PhD, 1990, Stanford University; judgement and decision making, measurement, statistics, group dynamics, psychology and law.
- Kenney, Nancy J. * 1976; PhD, 1974, University of Virginia; neural and endocrine controls of food and fluid intake, physiological basis of motivation.
- Kerr, F. Beth * 1974; PhD, 1974, University of Oregon; cognition, human motor control and learning, attention.
- Kivlahan, Daniel R. * 1983, (Adjunct); PhD, 1983, University of Missouri; evaluating assessment, prevention, and treatment approaches for addictive behaviors.
- Kohlenberg, Robert J. * 1968; PhD, 1968, University of California (Los Angeles); clinical behavior modification, learning, clinical psychophysiology, behavioral medicine.

Lee, Thomas W. * 1983, (Adjunct); PhD, 1984, University of Oregon; administrative theory and organizational behavior, human resources management.

McCauley, Elizabeth 1979, (Adjunct); PhD, 1973, State University of New York (Buffalo); clinical and developmental psychology.

Miller, Margaret A. 1981, (Adjunct); PhD, 1984, University of Washington.

Miyamoto, John M. * 1984; PhD, 1985, University of Michigan; mathematical models of mental processes, inductive reasoning and decision making.

Morrison, Diane M. * 1980, (Adjunct Research); PhD, 1982, University of Washington; sexual decision-making, attitudes and behavior, teen pregnancy.

Olavarria, Jaime F. * 1990; MD, 1974, State University of Chile; PhD, 1984, University of California (Berkeley); visual system: anatomy and physiology, comparative and developmental studies.

Ramsay, Douglas S. * 1983, (Adjunct); DMD, 1983, University of Pennsylvania; PhD, 1988, University of Washington; behavioral medicine/dentistry, physiological psychology, orthodontics, pediatric dentistry.

Root, Maria P. P. 1990, (Adjunct); MA, 1979, Claremont Graduate School; PhD, 1983, University of Washington; psychology of Asian Americans/multiracial couples.

Rose, Richard M. * 1966, (Emeritus); PhD, 1964, University of Pennsylvania; stochastic models, psychophysics, sleep.

Shaklee, Harriet * 1985, (Affiliate); PhD, 1976, University of Oregon; causal reasoning, social cognition, children's thinking.

Speltz, Matthew L. 1981, (Adjunct); MA, 1975, Western Washington University; PhD, 1980, University of Missouri; developmental psychotherapy, family therapy, pediatric behavioral medicine.

Spieker, Susan J. * 1983, (Adjunct Research); PhD, 1982, Cornell University; developmental psychology, infant security, mother-infant interaction.

Assistant Professors

Corina, David P. * 1993; PhD, 1991, University of California (San Diego); cognitive neuropsychology, psycholinguistics, computational modeling.

Ginorio, Angela B. * 1981, (Adjunct); PhD, 1979, Fordham University; women and science, violence against women, sexual harassment, racial identity among Latinos.

Jones, Theresa A. 1996; PhD, 1992, University of Texas (Austin); synaptic plasticity and recovery from brain damage.

Osterhout, Lee E. * 1991; PhD, 1990, Tufts University; psycholinguistics, cognitive psychophysiology.

Robinson, Elizabeth A. * 1987, (Affiliate); PhD, 1977, University of South Carolina; child-clinical, personality, family interaction.

Senior Lecturers

Fagan, Corey N. 1989; PhD, 1988, University of Massachusetts; clinical psychology, individual and family therapy for adults and adolescents.

McDermott, Lois J. 1986; PhD, 1979, University of Chicago; human sexuality and reproductive physiology.

Passer, Michael W. * 1990; MA, 1972, PhD, 1977, University of California (Los Angeles); social psychology, organizational psychology, teaching of psychology.

Lecturer

Mangelsdorf, Carolyn 1990; MA, 1984, Wake Forest University; PhD, 1993, University of Minnesota.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

PSYCH 101 Psychology as a Social Science (5) I&S McDermott, Osterhout, Passer Examines behavior from a social science viewpoint. Emphasizes human social behavior and influence, personality, learning, behavior disorders, and treatment. Includes related aspects of cognition, states of consciousness, motivation and emotion, perception, development, biological influences, and research methods. Offered: AWSpS.

PSYCH 102 Psychology as a Natural Science (5) NW Bernstein, Douglas, Sackett Behavior from a biological-science viewpoint. Emphasizes sensation and perception, brain and behavior, evolution, and animal behavior. Includes related aspects of cognition, behavior disorders, states of awareness, motivation and emotion, learning, development, and research methods. Offered: AWSpS.

PSYCH 200 Comparative Animal Behavior (5) NW Barash, Beecher, Brenowitz Research methods and findings of comparative animal behavior and their importance to an understanding of human behavior; rationale for study of behavioral differences and similarities between animal species, behavior viewed as part of the adaptation of each species to its natural habitat. Prerequisite: 102 or BIOL 201. Offered: AWSpS.

PSYCH 201 Human Performance Enhancement (3) I&S Smith, Smoll Applications of psychological theories, research, and intervention strategies to performance enhancement in variety of life settings. Self-regulation models and techniques; stress and emotional control; attention control and concentration; mental rehearsal; time management; goal-setting; memory enhancement; communication and interpersonal conflict resolution. Participation in various psychological training procedures. Prerequisite: 101 or 102. Offered: WS.

PSYCH 205 Introduction to Personality and Individual Differences (4) I&S Cauce, Linehan, Marlatt, B. Sarason, Smith Overview of the major theories, research findings, and applications in the scientific study of personality. Research methods and approaches to measuring personality variables also covered. Prerequisite: 101 or 102 or equivalent. Offered: AWSpS.

PSYCH 206 Psychosocial Aspects of Nuclear War (3) I&S Barash Introduction to basic issues of nuclear war, including its effects, weaponry, and history of the arms race. Primary focus on the psychological underpinnings of deterrence, relations between nations, and the personal and social forces operative in the arms race and peace movements.

PSYCH 207 Psychology of Peace (5) I&S Barash Examination of the psychological aspects of peace in the modern world. Topics include theories of individual aggressiveness and violence, leadership personalities, crisis decision making, nuclear psychology, images of the enemy, and psychological opportunities and obstacles to the establishment of a peaceful society. Offered: A.

PSYCH 209 Fundamentals of Psychological Research (4) Buck, Kerr, Passer, Smoll Psychological research methodology and techniques. Topics include the logic of hypothesis testing, experimental design, research strategies and techniques, fundamentals of scientific writing, search and evaluation of research literature in psychology, and ethical issues in psychological research. Required for all psychology majors. Prerequisite: 101 or 102 or equivalent. Offered: AWSpS.

PSYCH 210 Human Sexuality (5) I&S McDermott Broad survey of biological, psychological, and social determinants of human sexuality and sexual behavior. Topics include cultural diversity, sexual development (physical and psychological), sexual health, reproduction (pregnancy, contraception, abortion), development of sex, gender and orientation, adult sexual bonding, sexual abuse and assault.

PSYCH 213 Elementary Psychological Statistics (6) QSR Miyamoto Statistics for psychological research. Elementary probability theory, hypothesis testing, and estimation. Satisfies the statistics requirement for majors registered in the Psychology Bachelor of Arts degree program. Prerequisites: MATH 111 or 120 Offered: AWSpS.

PSYCH 217 Introduction to Probability and Statistics for Psychology (4) QSR Flitts, Ha, G. Loftus Probability theory as a model for scientific inference. Probabilistic variables and experimental outcomes, conditional probability, binomial and related distributions, experiments as samples, statistics and sampling distributions, the normal distribution, problems of estimation from experiments. Prerequisites: 209 and MATH 112 or 124, or permission of instructor. Offered: AWSpS.

PSYCH 218 Statistical Inference in Psychological Research (4) QSR Flitts, Ha, G. Loftus Hypothesis testing and its probabilistic and statistical basis. Development and application of statistical inference techniques employed in psychological research: t-test, analysis of variance, correlation and regression, and nonparametric statistics. Nature and control of experimental and inferential error in research. Required for majors in the psychology Bachelor of Science degree program or in the psychology honors or distinction programs. Prerequisite: 217. Offered: AWSpS.

PSYCH 222 Survey of Physiological Psychology (3) NW Douglas, Olavarria, Woods The nervous system and how it works. Learning, memory, sleep, the senses, and the emotions. For students who do not intend to specialize in physiological psychology. Prerequisite: major standing in a biological science or either 101 or 102. Offered: AWSpS.

PSYCH 231 Laboratory in Human Performance (3) I&S Selected aspects of human cognition, perception, and performance. Prerequisites: 209 and 213 or 217. Offered: AWSpS.

PSYCH 232 Laboratory in Animal Learning (3) NW Buck Selected aspects of animal learning emphasizing operant techniques with the rat. Prerequisite: 209. Offered: AWSpS.

PSYCH 233 Laboratory in Animal Behavior (5) NW Brenowitz Experience with a variety of animal species and experimental procedures and instrumentation. Prerequisites: 101 or 102, 209, 213 or 217, and 200 or BIOL 202, or equivalents. Offered: AWSpS.

PSYCH 240 Behavior Modification (4) I&S Jacobson, Kohlenberg, Linehan, Marlatt, R. Smith Survey of behavior modification application for students who plan careers in human services. Behavioral approach and associated research on such topics as sexual dysfunction, stress, athletic performance, phobias and anxieties, depression, marital discord, weight control, energy conservation, pollution, health, addictions, interpersonal relationships, creativity, industrial safety. Prerequisite: introductory psychology. Offered: S.

PSYCH 250 Racism and Minority Groups (4) I&S Barrett Overview of the causes, contexts, and consequences of racism and its effects upon minority groups and society. Emphasis on cultural history, cultural politics, and current issues facing African American, Native American, Hispanic American, and Asian-Pacific Islander American groups. Offered: odd years; Sp.

PSYCH 257 Psychology of Gender (5) I&S Kenney Major psychological theories of sex-role de-

velopment; biological and environmental influences that determine and maintain sex differences in behavior; roles in children, sex differences in aggression, cognitive abilities, achievement motivation, affiliation, and sexuality. Recommended: 101 or 102. Offered: jointly with WOMEN 257; AS.

PSYCH 304 Issues and Concepts in Community Psychology (4) I&S Community mental health, epidemiology, program evaluation, and social ecology; research, theory, and practice in community settings; the influence of community-environmental factors in individual functioning and their utilization to promote mental health. Prerequisite: 10 credits in psychology.

PSYCH 305 Abnormal Psychology (5) I&S Duncan, George, Kohlenberg, Linehan, McMahon, I. Sarason, Smith An overview of major categories of psychopathology, including description and classification, theoretical models, and recent research on etiology and treatment. Prerequisites: 10 credits in psychology, to include 101 or 102 or equivalent. Offered: AWSpS.

PSYCH 306 Developmental Psychology (5) I&S Barrett, Dale, Greenberg, Gunderson, Meltzoff Analysis of child development in relation to biological, physical, and social interactions from infancy to adolescence. Prerequisite: 101 or 102, or equivalent. Offered: AWSpS.

PSYCH 310 Motor Development (4) NW Small Analysis of motor development from prenatal origins through adolescence with emphasis on relations between biophysical and psychosocial development of children and youth. Prerequisite: 101 or 102 or equivalent. Offered: WSp.

PSYCH 322 Introduction to Drugs and Behavior (3) NW Diaz Basic concepts of drug action emphasizing the behavioral consequences of the intake of a variety of drugs. Prerequisite: 222. Offered: SpS.

PSYCH 333 Sensory and Perceptual Processes (4) NW Beecher, Buck, Olavarria Perception and processing by each of the senses with emphasis on behavioral studies and their relationship to underlying structure. Prerequisite: 101 or 102 or equivalent, or permission of instructor. Offered: SpS.

PSYCH 335 Human Factors Psychology (4) I&S Kerr Consideration of human performance factors in the design of tools/equipment, tasks/jobs, and work and living environments. Emphasis on the importance of human perception, memory, attention, and motor control for understanding ways to optimize the relationship between people and technology. Prerequisite: 101 or 102 and 209 or equivalent. Offered: SpS.

PSYCH 345 Social Psychology (5) I&S Brown, Greenwald Effects of the social environment upon the formation of individual attitudes, values, and beliefs, and upon individual and group behavior; major theoretical approaches; field and experimental research findings. Prerequisite: 101 or 102, or equivalent. Offered: AWSpS.

PSYCH 347 Psychology of Language I (5) VLPA/ I&S Dale, Corina, Osterhout Introduction to the study of language, including language structure, speech perception, language acquisition, psychological processes underlying comprehension and production of language, the relation between brain and language, and the question of the species-specificity of human language. Prerequisites 101 or 102 or LING 200 or 201. Offered: jointly with LING 347 A.

PSYCH 350- Honors Research Seminar in Psychology (2-, max. 6) Teller Presentations by professors and advanced honors or distinction students concerning the rationale, methodology, and progress of their research project. Four credits required for all junior honors and distinction candidates in conjunction with 498 and 499. Prerequisite: permission of departmental honors adviser. Offered: AWSp.

PSYCH 355 Survey of Cognitive Psychology (5) I&S Hunt, E. Loftus Current theory and research in perception, attention, memory and learning, attitudes, thinking and decision making, and language. For the student who wishes a survey or who intends additional work in any of the above content areas. Prerequisite: 101 or 102. Offered: AWSp.

PSYCH 357 Psychobiology of Women (5) NW Kenney Physiological and psychological aspects of women's lives; determinants of biological sex; physiological and psychological events of puberty, menopause; sexuality; contraception, pregnancy, childbirth, and lactation; role of culture in determining psychological response to physiological events. Prerequisite: 101 or 102 or 257 or WOMEN 257 or WOMEN 200. Offered: jointly with WOMEN 357; WS.

PSYCH 381 Laboratory in Social Psychology (6) I&S Greenwald Methods of systematic observation, content analysis, laboratory and field research on social behavior; individual research projects. Prerequisites: 345 and either 213 or 217, any of which may be taken concurrently. Offered: AWSp.

PSYCH 400 Learning (5) I&S/NW Experimental research and basic theories primarily in animal learning. Prerequisite: 101 or 102.

PSYCH 402 Infant Behavior and Development (3/ 5) I&S Meltzoff Psychological development in the first two years of life. Basic and advanced techniques for assessing psychological development in infancy. Classic theories of human infancy and examination of a wide range of new experiments about infant behavior and development. Prerequisite: 306 or 414 and junior or senior standing. Offered: A.

PSYCH 403 Motivation (5) I&S/NW Theory and research on reinforcement, punishment, frustration, preference, instinctual mechanisms, and other factors controlling animal behavior. Prerequisite: 101 or 102. Offered: S.

PSYCH 405 Advanced Personality: Theory and Research (5) I&S B. Sarason, I. Sarason Intensive survey of theoretical concepts and detailed review of experimental methods and experiments in the field of personality. Prerequisite: 205 or equivalent. Offered: W.

PSYCH 407 History of Psychology (5) I&S Historical and theoretical background of the basic assumptions of modern psychology, including such doctrines as behaviorism, determinism, and associationism and the scientists who developed them. Prerequisite: 400 or equivalent.

PSYCH 408 Mechanisms of Animal Behavior (4) NW Beecher, Brenowitz Comparative exploration of physiological and perceptual mechanisms that control behaviors necessary for survival and reproduction in animals. Model systems discussed include animal communication, mate choice, escape behavior, learning and memory, orientation, biological rhythms, foraging behavior. Prerequisites: 200 or BIOL 101 and 102 or permission of instructor. Offered: jointly with ZOOL 408; W.

PSYCH 409 Sociobiology (5) NW Beecher, Rohwer Biological bases of social behavior, emphasizing evolution as a paradigm. Topics are: individual versus group selection, kin selection, altruism, group versus individual living, mating systems, parental care of offspring, and competitive strategies. Prerequisites: 200 or BIOL 202 and 203 or equivalent. Offered: jointly with ZOOL 409.

PSYCH 410 Child and Adolescent Behavior Disorders (5) I&S McMahon Introduction to psychopathology in children and adolescents, and an overview of principal modes of intervention. Particularly for students interested in advanced work in clinical psychology, social work, or special education. Prerequisites: 305, 306, or equivalents. Offered: WS.

PSYCH 414 Cognitive Development (5) I&S Dale, Gunderson Key theoretical approaches to cognitive development from infancy through adolescence. Sensorimotor development, language development, imitation, number concepts, logical reasoning, memory, cognition in adolescents, intelligence, and the role of biology, environment, and experience. Prerequisite: 209 and 306 and junior or senior standing. Offered: A.

PSYCH 415 Personality Development of the Child (5) I&S Greenberg Socialization theory and research, infant attachment and social relationships, development of aggressive and altruistic behaviors, sex-role development, moral development, parent and adult influences. Applied issues in social development and policy. Prerequisite: 306. Offered: WS.

PSYCH 416 Animal Communication (5) NW Beecher, Brenowitz Evolution and mechanisms of animal communication and related processes of perception, thinking, and social behavior. Prerequisite: 200 or 233 or 10 credits in biology or zoology.

PSYCH 417 Human Behavior as a Natural Science (5) I&S/NW Lockard Evolution of human social behavior and the adaptive significance of communication systems from a sociobiological and anthropological perspective. Prerequisite: 102 or an introductory zoology or anthropology course. Offered: WS.

PSYCH 418 Primate Social Behavior (5) NW Lockard Social behavior, ecology, and group structure of monkeys and apes from an evolutionary, sociobiological, and anthropological perspective. Prerequisite: 102 or an introductory zoology or anthropology course. Offered: Sp.

PSYCH 419 Behavioral Studies of Zoo Animals (5, max. 10) NW Lockard Observational studies of behavior of zoo animals to expand basic knowledge of animal behavior, conservation of endangered species, and research methodology with discussions and tours focusing on zoo philosophy and operations. Offered in cooperation with Woodland Park Zoo. Recommended: 200; or 231, 232, 233; or 361; or equivalent. Offered: AS.

PSYCH 420 Drugs and Behavior (3) NW Diaz Animal and clinical research on the behavioral consequences of drug intake. Prerequisite: 322 or permission of instructor.

PSYCH 421 Neural Basis of Behavior (5) NW Diaz Anatomical and physiological principles and resultant behavior involved in the integrative action of the nervous system. 431 recommended but not required to follow 421. Prerequisites: 101 or 102, and 10 credits in biology or zoology. Offered: AS.

PSYCH 422 Physiological Psychology (5) NW Douglas Physiological mechanisms in behavior, including those basic to emotion, fatigue and sleep, learning, and memory. Prerequisite: 101 or 102, or equivalent. Offered: Sp.

PSYCH 423 Sensory Basis of Behavior (5) NW Olavarria Study of sensory mechanisms as a way to understand behavior. Basic properties of neurons, anatomy, and physiology of sensory systems, with some emphasis on the visual system. Prerequisite: 222 or 333 or permission of instructor. Offered: Sp.

PSYCH 424 Vision and Its Physiological Basis (5) NW Teller Behavioral neurobiology of human vision: color vision, acuity and spatial vision, light and dark adaptation, visual development. Correlation of visual functioning with known optical, biochemical, physiological, and anatomical substrates. Recommended: some background in physical or biological science or engineering. Offered: jointly with P BIO 424; W.

PSYCH 425 Surgical and Histological Techniques (5) NW Woods Practicum in basic and advanced surgical and histological techniques used in psychophysiological experimentation. Prerequisites: 421 and permission of instructor. Offered: A.

PSYCH 427 Behavioral Endocrinology (5) NW Woods The endocrine system and how its secretions influence and are influenced by behavior; relationships between the nervous and endocrine systems. Prerequisites: 421 and two quarters of zoology, or permission of instructor. Offered: Sp.

PSYCH 428 Human Motor Control and Learning (5) I&S/NW Kerr Current theory and research in human motor performance and skill acquisition. Prerequisite: 101 or 102 and 209 or equivalent. Offered: W.

PSYCH 429 Brain Anatomy for the Behavioral Scientist (1) NW Diaz Detailed review of the neuroanatomical features of the sheep brain with laboratory demonstrations. Prerequisites: 421 or equivalent, or concurrent registration in 421, and permission of instructor. Offered: A.

PSYCH 431 Neural Basis of Behavior (5) NW Diaz Anatomical and physiological mechanisms in behavior, including those basic to emotion, fatigue and sleep, learning, and memory. Prerequisite: 421. Offered: W.

PSYCH 433 Regulatory Behavior (4) NW Neural and endocrine mechanisms in the control of food and water intake and the regulation of body weight and fluid balance. Prerequisite: 421 or 427 or permission of instructor.

PSYCH 434, 435 Laboratory in Vision (2, 3) NW Buck Techniques of research in visual psychophysics: alignment and calibration of basic optical systems; replication of some classical vision experiments and/or design and completion of original vision experiments. Prerequisites: 424 and permission of instructor for 434; 434 and permission of instructor for 435.

PSYCH 436 Developmental Aspects of Sport Competition (4) I&S Small Biophysical and psychosocial influences of sport participation on growth and development of children and youth. Competition readiness, injuries, stress, aggression, roles and responsibilities of parents and coaches. Prerequisite: 101 or 102 or equivalent and 15 additional credits in psychology. Offered: AS.

PSYCH 438 Social Psychology of Sport I (4) I&S Smith, Small Reciprocal effects of interpersonal and group influence processes, e.g., social facilitation, behavior modification, observational learning, individual versus group performance, group cohesion, leadership, aggression. Prerequisite: 101.

PSYCH 439 Social Psychology of Sport II (4) I&S Smith, Small Current issues and research, e.g., anxiety and arousal, competition, motivation, personality, attitudes, individual differences in motor performance. Prerequisite: 438 or permission of instructor. Offered: Sp.

PSYCH 441 Perceptual Processes (5) I&S/NW Theory and findings in perception with a focus on visual perception in humans. Discrimination and constancy for simple judgments, segregation and identification of visual objects, and specific areas of investigation such as reading and computer vision. Prerequisite: 333 or equivalent.

PSYCH 445 Theories of Social Psychology (5) I&S Brown, Gonzalez Evaluation of the major theories of human social behavior supported by the empirical literature; theories of social cognition and thought; major theories of social interaction, group processes, and social learning. Prerequisites: 345 or equivalent.

PSYCH 446 Objective Assessment of Personality (3) I&S R. Smith Measurement of personality variables in personality research, social psychology, and clinical psychology. Theoretical conceptions underlying various clinical and experimental scales and an assessment of their construct validity and behavioral correlates. Planning of research involving the use of objective measures of personality.

PSYCH 447 Psychology of Language II (4) VLPA/I&S Osterhout Psychological principles applied to linguistic development and organization; language in both its stimulus and response aspects. Prerequisite: 101 or 102 or equivalent. Offered: jointly with LING 447; W.

PSYCH 448 Seminar in Psychology (1-15) Selected research topics of contemporary interest. Quarterly listings of specific offerings are available at departmental advisory office. Prerequisites: some sections require major standing or permission of instructor. Offered: AWSpS.

PSYCH 449 Organizational and Industrial Psychology (3) I&S Passer Examines research on human behavior in industrial and organizational environments. Topics include research methods, job analysis, the prediction of workplace performance, personnel selection and training, performance appraisal, group influences, job satisfaction, job motivation, leadership, and human factors. Prerequisite: one course in elementary statistics or equivalent. Offered: S.

PSYCH 450- Honors Research Seminar in Psychology (2-, max. 8) Teller Design, execution, and writing of honors thesis, supervised by faculty sponsor and departmental honors adviser. Four credits required for all senior honors and distinction candidates in conjunction with 498 and 499. Prerequisite: permission of departmental honors adviser. Offered: AWSp.

PSYCH 451 Health Psychology (5) I&S/NW Bowen Overview of the psychological and behavioral factors in health and disease. Includes research on both psychological causes and treatments. Topics include stress, risky behaviors, patient-provider interactions, pain, behavioral/medical treatments, and lifestyle interventions. Prerequisites: 101 or 102 or equivalent; 209 or equivalent; one from 205, 222, 305, or 345. Offered: S.

PSYCH 452 Psychology of the Self-Concept (4) I&S Brown Examines psychological theory and research on the role of the self-concept in regulating behavior. Topics include the development of the self-concept; self-awareness; and self-esteem maintenance. Prerequisites: 345; upper division or graduate standing.

PSYCH 455 Developmental Social Psychophysiology (2-5) I&S/NW Gottman Fundamentals of psychophysiology, emotion, and social interaction in developmental research. Laboratory and lectures emphasize skills in the study of basic biological process in the social context of the developing person. Prerequisites: 101 or 102, 213, 306, 422, upper-division standing, or permission of instructor.

PSYCH 457 Language Development (5) VLPA/I&S Dale First-language acquisition and use by children. Emphasis on theoretical issues and research techniques. Prerequisite: 306 or LING 400 and junior or senior standing. Offered: jointly with LING 457; Sp.

PSYCH 461 Cognitive Neuropsychology (4) NW Corina, Osterhout Discussion of neural systems underlying cognitive behavior with particular focus on breakdown of cognition following brain damage. Topics include object and space perception, language, voluntary movement, attention, and memory. Examination of contributions from related areas of neuroimaging, visual perception, linguistics, physiology, and neuroscience. Prerequisite: 222, 333, or 355. Offered: A.

PSYCH 462 Human Memory (5) I&S Joslyn Current theoretical and experimental literature. Prerequisite: 209.

PSYCH 463 The Pathology of Human Memory (5) NW Effects of brain damage on human memory; comparison of observed kinds of losses with current theories of memory: amnesia and other impairment of intellectual functions (aphasia, agnosia, apraxia) as

they relate to memory. Prerequisite: 421. Recommended: 461 or 462.

PSYCH 464 Metacognition (5) I&S Self-monitoring and self-control of an individual's own cognitive processes. Metacognitive aspects of memory and judgment under uncertainty. Methodology and findings of empirical research on metacognition. Prerequisite: 462 or PHIL 460. Recommended: 462.

PSYCH 465 Intelligence in Psychology (3) I&S Hunt Historical and contemporary treatments of the concept of intelligence by psychology, evolution and validity of techniques for assessment, biological and environmental issues in assessment, intelligence and personality, experimental and psychometric indicators of the future role of intelligence in psychology. Prerequisite: 15 credits in psychology, including one statistics course. Offered: A.

PSYCH 466 Psychology of Judgment and Decision Making (5) I&S Gonzalez, Miyamoto Human information processing in judgment and decision making, especially the interface between cognitive theories and normative and prescriptive theories of decision making. Prerequisites: introductory statistics and either 209, 231, 355, or 361 or permission of instructor. Offered: S.

PSYCH 467 Eyewitness Testimony (3) I&S E. Loftus Perception, memory, and retrieval of real world events. The eyewitness in the legal system. Psychologists as expert witnesses regarding eyewitness accounts. Prerequisites: introductory psychology plus eight additional credits in psychology. Offered: W.

PSYCH 468 Information Processing (4) I&S Hunt Human thought as a phenomenon to be described by formal models. Current theories and experimental studies of rational information processing; emphasis on how man notices, recognizes, remembers, and recalls information used in rational problem solving; theoretical models of attention, memory, and recall; cognitive models of rational problem solving. Prerequisite: 231 or 355, or equivalent.

PSYCH 469 Psychology of Reasoning (4) I&S Miyamoto Cognitive processes in deductive and inductive reasoning and in problem solving. Relations between descriptive and normative theories of inference. Prerequisites: introductory statistics and either 231, 354, or 355 or graduate standing. Offered: Sp.

PSYCH 470 Psychology and Music (5) VLPA/I&S Introduction to the scientific study of musical behavior. An overview of current topics in the psychology of music from the areas of musical perception and cognition, musical development, music therapy, musical performance, and composition. Includes psychoacoustical and neuropsychological foundations, research methods, and some basic material in music theory. Prerequisite: 101 or 102.

PSYCH 489 Clinical Psychology (3) I&S Basic issues, methods, and research: professional issues, psychological assessment, and approaches to psychotherapy and behavioral change. Prerequisites: 205 and 305, and upper-division major standing.

PSYCH 480 Stress Management (3) I&S/NW Nature of stress. Physiological responses to stress and relaxation. Techniques of stress management with training in relaxation, biofeedback, meditation, cognitive restructuring, exercise, nutrition, interpersonal communication skills, and time management. Credit/no credit only. Prerequisite: 101 or 102 or equivalent. Offered: S.

PSYCH 485 Introduction to Law: A Social Science Perspective (4) I&S Loh Uses and limits of social science in the law-making process on appeal and the fact-finding process at trial. Critical perspectives on the role of social science, especially social psychology, in adjudication. Instruction by use of case method, Socratic questioning, and discussion. Readings in judicial opinions, jurisprudential essays, and

empirical research reports. Prerequisite: upper-division or graduate standing. Offered: jointly with LAW 495.

PSYCH 496 Undergraduate Teaching Experience in Psychology (2-3, max. 6) Students are trained as assistants in quiz sections or as supplemental tutors for undergraduate psychology courses. Designed especially for those students planning graduate work or education certification. An overall maximum of 18 credits in 496, 497, 498, and 499 may apply toward a baccalaureate degree. Prerequisites: upper division major standing and permission of instructor. Offered: AWSpS.

PSYCH 497 Undergraduate Fieldwork (1-3, max. 18) Individual consultation with faculty member and supervised practicum experience in a broad range of community settings and agencies dealing with psychological problems. An overall maximum of 18 credits in 496, 497, 498, and 499 may apply toward a baccalaureate degree. Prerequisites: junior or senior major standing and permission of instructor.

PSYCH 498 Directed Reading in Psychology (1-3, max. 18) Readings in special interest areas under supervision of departmental faculty. Discussion of reading in conference with the instructor. An overall maximum of 18 credits in 496, 497, 498, and 499 may apply toward a baccalaureate degree. Prerequisite: permission of a supervising psychology faculty member. Offered: AWSpS.

PSYCH 499 Undergraduate Research (1-3, max. 18) Design and completion of individual research projects. An overall maximum of 18 credits in 496, 497, 498, and 499 may apply toward a baccalaureate degree. Prerequisites: 213 or 217, and permission of a supervising psychology faculty member. Offered: AWSpS.

Courses for Graduates Only

PSYCH 500 Laboratory in Statistical Computation I (2) *Miyamoto* Techniques of computation using statistical software on personal computers. Organization of data files, transformations of variables, graphical representations of data, descriptive statistics, elementary inferential statistical analyses. Prerequisite: concurrent enrollment in 513 or permission of instructor. Offered: A.

PSYCH 501 Laboratory in Statistical Computation II (2) *Gonzalez* Techniques of statistical computation using statistical software on personal computers and mainframe computers. Multiple regression, analysis of variance and covariance. Planned and post hoc comparisons and confidence intervals. Data analytic diagnostics for violations of regression assumptions. Prerequisites: 500 and 513, concurrent enrollment in 514, or permission of instructor. Offered: W.

PSYCH 503 Advanced Social Psychology (4) *Brown* Historical overview of the fundamental principles underlying social psychological research on attitudes, interpersonal perception, and social relations; small-group and leadership processes; attribution theory. Open to advanced undergraduates with permission of instructor. Prerequisites: 213 and 345 or equivalent and some background in social science. Offered: A.

PSYCH 504 Biological Basis of Development (4) *Bernstein* Embryological, genetic, physiological, and evolutionary perspectives of human development; biological development in infancy; sensory development and its influence on the development of perception; primate models for human development. First quarter of a three-quarter proseminar required for graduate majors in developmental psychology. Prerequisite: graduate standing or permission of instructor. Offered: A.

PSYCH 505 Early Cognitive and Linguistic Development (4) *Meltzoff* Focus on the origins and early development of thought and language. Piagetian

theory and modern-day revisions of it emphasized. In depth examination of historical and philosophical bases for current empirical research. Second quarter of a three-quarter proseminar, required for graduate majors in developmental psychology. Prerequisite: graduate standing or permission of instructor. Offered: W.

PSYCH 506 Personality and Social Development (4) *Greenberg* Theories and empirical literature in personality and social development throughout infancy, childhood, and adulthood. Third quarter of a three-quarter proseminar required for graduate majors in developmental psychology. Prerequisite: graduate standing or permission of instructor. Offered: Sp.

PSYCH 508 Research Methods in Social Psychology (4, max. 8) *Greenwald* Examination of methodological, practical, and communication problems associated with research on human behavior. Topics include: selecting research problems, use of theory, types of validity, common sense about statistics, when to replicate, dealing with unpredicted results, strategies for presentation and publication. Prerequisite: graduate standing or permission of instructor.

PSYCH 509 Leadership and Organizational Effectiveness (3) A critical evaluation of current theories of leadership and management, and their implications for selection, assessment, performance, evaluation, training, task design, and the management of groups and organizations. Prerequisite: 213 or equivalent course in statistics; advanced undergraduates by permission of instructor.

PSYCH 510 Advanced Attitude Theory (5) *Greenwald* Theoretical, methodological, and empirical work on the concept of attitude and its practical applications. Topics include: definition of attitude, measurement of attitudes, information processing theories, functional theories, cognitive structure theories, the self as attitude object, unconscious attitudinal processes. Prerequisites: 444, 445, 503, and 514 or equivalent; or permission of instructor. Offered: A.

PSYCH 511 Personality: Motivation and Psychodynamics (3) *Sarason* Review of personality research. Roles of cognitive, motivational, and psychodynamic processes. Critical evaluation of current personality research as it relates to concepts of personality, its antecedents, and influences over behavior. Attention to role of personality variables in social relationships. Prerequisite: graduate or professional standing or permission of instructor.

PSYCH 512 Personality Disorders (4) Examines theoretical, research, and clinical literature on personality disorders. Critical review of current diagnostic criteria, assessment instruments, validation strategies, biological and psychological research relevant to epidemiology, longitudinal course, family genetics, developmental antecedents, correlates, personality disorder treatment. Prerequisite: graduate or professional standing or permission of instructor.

PSYCH 513 Introduction to Statistics and Data Analysis (4) *Miyamoto* Basic concepts of statistical theory and methods of data analysis. Emphasis on the integration of statistical theory, statistical computation, and psychological research methods. Required of all first-year graduate students in psychology. Prerequisite: concurrent enrollment in 500 and graduate standing or permission of instructor. Offered: A.

PSYCH 514 Linear Models and Data Analysis (4) *Gonzalez* Analysis of data in the behavioral sciences. Required of all first-year graduate majors. Prerequisites: 500, 513; concurrent registration in 501, or permission of instructor. Offered: W.

PSYCH 515 Modeling Experimental and Observational Data (4) *Gonzalez, Lunneborg* An introduction to statistical modeling; interactive data analyses; use of regression, ANOVA, logistic regression, and log-linear models in explanatory studies. Prerequisite: 514. Offered: SpS.

PSYCH 516 Latent Variables and Measurement Error (4) *Gonzalez, Greenwald* Analyses techniques to assess effects of latent variables in presence of error in observed data. Provides experience with statistical tools for confirmatory structural equation modeling and testing of hypotheses concerning causal and other relations among latent variable. Prerequisite: 515 or permission of instructor.

PSYCH 517 Psychophysics and Fundamental Measurement (3) Application of mathematics (drawn from set theory, finite mathematics, and probability theory) in the areas of measurement and psychophysics. Open to undergraduates with permission of instructor. Prerequisite: 514 or equivalent.

PSYCH 518 Single Subject Design and Research (3) *Kohlenberg* Single subject designs (reversal, multiple baseline, changing criterion) and their application to clinical cases. Prerequisite: graduate major standing in clinical psychology or permission of instructor. Offered: W.

PSYCH 519 Statistical Methods in Longitudinal Research (3) *Sackett* Those aspects of statistics and experimental design unique to, or heavily used in, developmental research; behavioral observation methods, analysis of variance and nonparametric techniques, time series and survival, analysis and repeated measure techniques for studying change over time. Prerequisites: 514 or equivalent, and graduate standing.

PSYCH 520 Theory of Educational and Psychological Measurement (3) *Sax* Theory of measurement; examination of assumptions involved in test theory; errors of measurement, factors affecting reliability and validity, and norms and their use and development. Prerequisites: 213 or 217, and permission of instructor.

PSYCH 522 Cognitive Perception (3) *G. Loftus* Current topics in perception; psychophysics, sensory memory, pattern recognition, letter and word perception, and visual masking. Prerequisites: 441 and 517, or permission of instructor. Offered: Sp.

PSYCH 523 Cognition (5) *Hunt* Problem solving, concept learning, individual differences in cognition, attention, and pattern recognition; computer simulation and mathematical models of cognitive phenomena. Prerequisites: graduate standing and completion of departmental mathematical and statistical requirement through 514.

PSYCH 524 Cognitive Approaches to Human Memory (3) *Loftus* Examination of current topics in human memory from the perspective of cognitive psychology. Prerequisites: 355 and graduate standing or permission of instructor. Offered: Sp.

PSYCH 525 Assessment of Intelligence (5) Current theory and research on intelligence and intelligence testing; training in administration, scoring, and interpretation of major intelligence tests; ethical issues in assessment. Prerequisite: graduate major standing in child clinical or clinical psychology, or graduate minor standing in child clinical psychology. Offered: Sp.

PSYCH 526 Psychological Assessment of Children (5) *Dawson* Assessment techniques appropriate to children, including those for infants, special problems of preschool and school-age children; projective tests, family interviews, and target observational assessment; training in administration of selected techniques. Prerequisites: 525 and permission of instructor.

PSYCH 527 Psychological Assessment of Adults (3) *Broedel* Training in adult assessment and development of skills in administration, scoring, and interpretation of the Rorschach with some attention to other projective techniques. Prerequisites: 525 and permission of instructor. Offered: W.

PSYCH 528 Emotional Development (4) Current theory and research on emotional development in in-

fants, children and adolescents. Reviews work on emotional recognition, expression, and understanding. Special emphasis on family and social influences on emotional development, as well as links to psychopathology. Prerequisite: graduate standing or permission of instructor.

PSYCH 533 Teaching of Psychology (3) *Passer* Examines issues concerning the teaching of psychology, including goals of education, course development, instructional methods, T.A.-student and T.A.-faculty relations, grading, student diversity, and ethics. Readings and assignments are designed to enhance students' organizational, presentational, and problem-solving skills. Credit/no credit only. Prerequisite: graduate standing in the Department of Psychology.

PSYCH 534 Foundations of Psychological Research (3) Interpretation of psychological research results, related issues from the philosophy of science, and nonstatistical pitfalls in psychological research. Prerequisite: 513, which may be taken concurrently.

PSYCH 535 Approaches to Psychological Assessment (4) Problem-solving approach to psychological assessment; review of psychological tests and procedures and presentation of approaches to their clinical interpretation and use. Required for all graduate students majoring in clinical and child-clinical psychology. Prerequisite: graduate major standing in clinical psychology. Offered: Sp.

PSYCH 536 Behavioral Assessment (4) *Linehan* Research, theory, and technique in behavioral assessment. Emphasis on assessing for change and relationship between assessment and therapy. Interviewing, observational techniques, self-monitoring, simulated environments, and physiological, self-report, and imaginal procedures. Prerequisites: clinical psychology graduate standing and permission of instructor.

PSYCH 538 Systems of Psychotherapy (3) *George, Marlatt* Theory and research of major systems of psychotherapy, including the psychodynamic, behavioral, cognitive, and family systems approaches as an introduction to subsequent practice in clinical psychology. Required for all graduate students majoring in clinical psychology. Prerequisites: graduate major standing in clinical psychology and permission of instructor. Offered: A.

The content of each graduate seminar (numbered 540 through 560) offered by the department changes from quarter to quarter. A list of offerings is published each quarter and can be obtained from the Department of Psychology.

PSYCH 540 Seminar in Clinical Psychology (2) *Baer, Broedel, Cauce, Dawson, George, Jacobson, Kohlenberg, Linehan, Marlatt, McMahon, Sarason, Smith* Prerequisite: permission of instructor.

PSYCH 541 Seminar in Cognitive Processes (2) *Hunt, E. Loftus, G. Loftus* Prerequisite: permission of instructor.

PSYCH 542 Seminar in Animal Behavior (2) *Barash, Beecher, Brenowitz, Lockard* Prerequisite: permission of instructor.

PSYCH 543 Seminar in Developmental Psychology (2) *Dale, Greenberg, Meltzoff, Sackett* Prerequisite: permission of instructor.

PSYCH 546 Seminar in Learning (2) Prerequisite: permission of instructor.

PSYCH 547 Seminar in Motivation (2) Prerequisite: permission of instructor.

PSYCH 548 Seminar in Perceptual Processes (2) Prerequisites: 441 and permission of instructor.

PSYCH 549 Seminar in Physiological Psychology (2) *Bernstein, Diaz, Douglas, Kenney, Simpson, Teller, Woods* Prerequisite: permission of instructor.

PSYCH 550 Seminar in Psycholinguistics (2) *Dale, Osterhout* Prerequisites: 447 and permission of instructor.

PSYCH 551 Seminar in Psychophysics (2) *Buck, Teller* Prerequisite: permission of instructor.

PSYCH 552 Seminar in Quantitative Techniques (2) *Hunt, Lunneborg, Nelson, Rose* Prerequisite: permission of instructor.

PSYCH 553 Seminar in Social Psychology (2) *Brown, Gonzalez, Greenwald* Prerequisite: permission of instructor.

PSYCH 554 Seminar in Decision Processes (2) *Gonzalez, Miyamoto* Prerequisite: permission of instructor.

PSYCH 555 Seminar in Metacognition (2) Prerequisite: permission of instructor.

PSYCH 559 Seminar in Current Research in Vision (1) *Buck, Olavarria, Teller* Prerequisite: permission of instructor.

PSYCH 560 Seminar (* max. 30) Prerequisite: permission of instructor. Offered: AWSPS.

PSYCH 570 Child Clinical Psychology (4) Issues and content of child clinical psychology, promotion of student's beginning work in research. Prerequisite: graduate major or minor standing in child-clinical psychology.

PSYCH 571 Child Psychopathology (5) *McMahon* Broad survey of major categories of child and adolescent disorders. Emphasis on scientific, empirical approach to description, classification, and research literature on these disorders. Required for all graduate students majoring in child clinical psychology. Prerequisite: graduate standing in psychology or permission of instructor. Offered: W.

PSYCH 572 Approaches to Child Treatment (4) *Barrett, Dawson* Major approaches to child psychotherapy, including specific applications, issues in treatment, and research. Prerequisites: graduate major standing in child-clinical psychology or permission of instructor. Offered: Sp.

PSYCH 574 Community Psychology (4) *Cauce* Overview of key issues and concepts in the field of community psychology. History of field and overview of different models used to conceptualize system-level mental health issues and delivery systems. Emphasizes theory and research rather than intervention. Prerequisite: psychology graduate student or permission of instructor. Offered: alternate years.

PSYCH 575 Minority Mental Health (3) *Barrett, George* Surveys topics on mental health and treatment of racial and ethnic minorities. Theory emphases include: models addressing ethnic identity, cross-cultural differences, models of culturally sensitive intervention. Practices emphases include unique psychotherapy strategies for: African-, Asian-, and Latino-Americans, and American Indians. Prerequisite: graduate clinical major standing in psychology or permission of instructor.

PSYCH 576 Intervention Techniques With Families (3) Theory and practice of principal methods of therapeutic intervention with families. Attention to clinical problems arising in a family context and use of family members and processes by the clinician. Prerequisites: 575, 592 and 593 or equivalent and permission of instructor.

PSYCH 578 Affective Disorders: Theory and Research (2) *Jacobson* Causes, sustainers, correlates, and consequences of affective disorders, including biological and psychosocial factors. Credit/no credit only. Prerequisite: graduate or professional student standing or permission of instructor. Recommended: graduate course in psychopathology and personality.

PSYCH 579 Treatment of Affective Disorders: Methods and Evaluation (2) *Jacobson* Differential diagnosis of depression and depressive subtypes; emphasis on psychodynamic, cognitive-behavioral, and combined forms of psychological treatment of less severely incapacitated patients; biological approaches (electroconvulsive therapy) as alternative or adjunctive treatments in severe, psychotic, and endogenous-like depressions. Credit/no credit only. Prerequisites: 578, graduate or professional student standing or permission of instructor. Recommended: graduate course in psychopathology and personality.

PSYCH 585 Research in Psychotherapy (5) *Marlatt* Research in psychotherapy, including process and outcome. Experience in research design. Prerequisites: graduate major standing and permission of instructor.

PSYCH 586 Clinical Personality Assessment (3) *R. Smith* Use of objective personality inventories in the description of normal and abnormal personality and use of such information in case conceptualization and treatment planning. Minnesota Multiphasic Personality Inventory, Millon Clinical Multiaxial Inventory. Credit/no credit only. Prerequisite: clinical psychology graduate standing. Offered: S.

PSYCH 587 Clinical Methods: Interviewing (2) *Fagan* Provides the foundation for developing good clinical skills. Enables students to conduct an initial clinical interview and generate a diagnostic formulation, problem list, and treatment plan after taking a complete history. Limited to and required of all second year clinical psychology graduate students. Credit/no credit only. Offered: A.

PSYCH 588 Clinical Methods: Ethics (2) *Fagan* Enables students to acquire a thorough working knowledge of the American Psychological Association's Ethical Standards for Psychologists; an awareness of Washington State law as it affects psychologists and a knowledge of how to identify and solve ethical dilemmas. Limited to and required of all second year clinical psychology graduate students. Credit/no credit only. Offered: W.

PSYCH 589 Advanced Clinical Practicum (4) *Cauce, Dawson, George, Jacobson, Kohlenberg, Marlatt, McMahon, Smith* Supervised psychotherapy involving several individual clients. Separate consultations with instructor for intensive supervision of each case. Occasional meetings in small groups of instructors and students to discuss case material. Assigned readings appropriate to each case with opportunities to discuss these with instructor. Prerequisites: clinical psychology graduate standing and permission of instructor. Credit/no credit only. Offered: AWSPS.

PSYCH 590 Practicum in Psychological Assessment (2) Demonstration and practice of selected psychological test procedures and interviewing skills. Concurrent registration in 535 required. Required for all first-year graduate students majoring in clinical and child-clinical psychology. Prerequisites: graduate major standing in clinical or child-clinical psychology and permission of instructor. Offered: Sp.

PSYCH 591 Issues in Clinical Psychology (1, max. 3) *Cauce* Personal and professional issues in clinical psychology. Required for all first-year graduate students majoring in clinical and child-clinical psychology. Credit/no credit only. Prerequisite: graduate major standing in clinical psychology. Offered: AW.

PSYCH 592 Clinical Proseminar (1, max. 3) Introduces major theoretical areas in clinical psychology. Emphasis on applied theory. Students conceptualize a clinical case from theoretical perspective presented and develop an understanding of salient forms of intervention representative of that theoretical orientation. Limited to and required of all second year clinical psychology graduate students. Credit/no credit only.

PSYCH 593 Clinical Colloquium and Clinic Practicum (1-6, max. 24) Required of all clinical

psychology graduate students seeing clients in the clinic. Clinical colloquium required of all second-year students, optional for others. Credit/no credit only. Offered: AWSpS.

PSYCH 594 Advanced Personality Theory (5) *Linehan* Conceptual models of behavioral functioning, cognition, emotion, and environment as organizers of behavior and other critical issues in personality theory. Opportunity to integrate previous courses, research, and practice, and arrive at coherent theoretical framework. Required for graduate majors in clinical psychology. Prerequisite: graduate or professional standing or permission of instructor. Offered: W.

PSYCH 595 Behavior Disorders (5) *I. Sarason* Major types of behavior disorders, with emphasis on clinical manifestations, relevant research, and theoretical perspectives. Required for all graduate students majoring in clinical psychology. Prerequisite: graduate major standing in clinical psychology or permission of instructor. Offered: W.

PSYCH 596 Psychology of Behavior Change (5) *Jacobson, Kohlenberg* Behavioral theory and behavioral approaches to treatment. Prerequisites: 595 and permission of instructor. Offered: Sp.

PSYCH 597 Fieldwork in Clinical Psychology (1-5, max. 38) *Baer, Broedel, Cauce, Dawson, George, Jacobson, Kohlenberg, Linehan, Marlatt, McMahon, N. Robinson, I. Sarason, R. Smith* Prerequisites: second-year graduate major standing and permission of departmental faculty.

PSYCH 598 Directed Reading in Psychology (*) (max. 30) Selected topics. Prerequisite: permission of a supervising psychology faculty member.

PSYCH 599 Directed Research in Psychology (1-3, max. 24) Supervised participation in research. Prerequisite: permission of a supervising psychology faculty member.

PSYCH 600 Independent Study or Research (*) Offered: AWSpS.

PSYCH 700 Master's Thesis (*) Offered: AWSpS.

PSYCH 800 Doctoral Dissertation (*) Offered: AWSpS.

Romance Languages and Literature

C104 Padelford

The department consists of two divisions: *French and Italian Studies* and *Spanish and Portuguese Studies*. The divisions offer programs designed to develop competence in the reading, speaking, and writing of the languages and in the study of the literatures and cultures.

French and Italian Studies

C258 Padelford

Undergraduate Program

Adviser
C252 Padelford

Bachelor of Arts

Major Requirements

French: 54 credits beyond 203, to include 301, 302, 303 (or 313); 304, 305, 306, 323. Five 400-level courses chosen to satisfy the requirements for an emphasis on literature/culture. Transfer credits at the 400 level are accepted only by petition to the Faculty Studies Committee.

Italian: 50 credits in courses at the 300 and 400 levels, including 301, 302, 303, 401, 402, 403; 15 additional credits in literature courses at the 400 level. Consult Italian adviser about courses in translation.

Minor

Minor Requirements: Italian—30 credits in courses at the 300 and 400 levels, including ITAL 301, 302, 303, and 401, 402, 403 (or equivalent 400-level courses).

Graduate Program

The Division of French and Italian Studies offers programs of graduate study leading to the degrees of Master of Arts in French or Italian and Doctor of Philosophy in French. Students who wish to complete their doctoral studies in Italian may do so through the Department of Comparative Literature.

The Master of Arts degree may be with thesis or without thesis in the main area specialization of language and literature.

Students enrolled in the doctoral program of French language and literature should devote at least two-thirds of their course work to the field specialization. Some training in the history of language is required.

Information on specific requirements for the various degree programs is available upon request from the office of the graduate program adviser.

Financial Aid

The department awards annually a number of teaching assistantships. The assistant normally participates in teaching three classes during the academic year. Each class is limited to approximately 25 students and meets 5 hours a week for the 10 weeks of the quarter.

Correspondence and Information

Graduate Program Adviser
C252 Padelford, Box 354360

Faculty

Chair

Eugene Vance

Professors

Borch-Jacobsen, Mikkel * 1986; Doct, 1981, University of Strasbourg (France); French twentieth-century literature, modern philosophy, psycho-analysis.

Creore, A. Emerson 1940, (Emeritus); MA, 1936, University of Rochester; PhD, 1939, Johns Hopkins University.

Friedman, Lionel J. 1961, (Emeritus); PhD, 1950, Harvard University.

Keller, Abraham C. * 1948, (Emeritus); PhD, 1948, University of California (Berkeley); sixteenth-century French literature.

Leiner, Jacqueline * 1963, (Emeritus); Dr ès Lettres, 1968, University of Strasbourg (France); modern French literature.

Nostrand, Howard L. 1982, (Emeritus); MA, 1933, Harvard University; Docteur, 1934, University of Paris (France); French culture and civilization.

Pace, Antonio 1980, (Emeritus); MA, 1937, Syracuse University; PhD, 1943, Princeton University; Italian language and literature.

Vance, Eugene * 1990; PhD, 1964, Cornell University; medieval literature, the history of criticism, and discourse analysis.

Wilson, Clotilde 1926, (Emeritus); MA, 1927, PhD, 1931, University of Washington; French language and literature.

Associate Professors

Collins, Douglas P. * 1980; PhD, 1978, University of Missouri; twentieth-century French literature.

Dale, Robert C. * 1963, (Emeritus); PhD, 1963, University of Wisconsin; nineteenth-century French literature, cinema.

Ellrich, Robert J. * 1964, (Emeritus); PhD, 1960, Harvard University; eighteenth-century French literature.

Friedrich, Pia * 1965, (Emeritus); PhD, 1946, University of Turin (Italy); pedagogy and twentieth-century Italian literature.

Wortley, W. Victor * 1955, (Emeritus); PhD, 1964, University of Oregon; seventeenth-century French theatre and prose (nonfiction).

Assistant Professors

Delcourt, Denyse * 1990; PhD, 1987, University of Montreal (Canada); French Middle Ages, French Renaissance, French women writers and Quebecois literature.

Hanafi, Zakiya A. J. * 1991; PhD, 1991, Stanford University; early modern French and Italian intellectual history and twentieth-century literary theory.

Sbragia, Albert J. * 1989; PhD, 1988, University of California (Berkeley); modern and contemporary Italian literature and cinema.

Sugano, Marian Z. * 1987; PhD, 1987, University of California (Berkeley); nineteenth- and twentieth-century French literature.

Senior Lecturer

Yowell, Donna Lynne * 1988; PhD, 1987, University of California (Berkeley); medieval Italian literature, Dante, Occitan lyric.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

French

Credit: The sequence 121, 122, 123 is parallel to 101, 102, 103; students can receive credit for 101 and 121 but not for 102 and 122 or 103 and 123. 101 or 121 cannot be taken for credit after 102, 103, 122, or 123. 134 is a 15-credit intensive course exactly equivalent to 121, 122, 123; a maximum of fifteen credits are allowed for 134 and any of 102, 103, 121, 122, and 123. A student who completes 134 cannot later take 101 for credit, but a student who earns credit for 101 first can take 134 for fifteen additional credits.

FRENCH 101, 102, 103 Elementary (5, 5, 5) Methods and objectives are primarily oral-aural. Oral practice in the language laboratory is required. Prerequisite for 102: 101 or college equivalent, or placement; for 103: 102 or equivalent, or placement.

FRENCH 110 Basic French Review (5) Combines in one quarter the contents of 101 and 102. Designed for students who have studied French in high school but who do not feel ready for 102. Highly motivated beginners with background in other languages also encouraged to take the course.

FRENCH 121, 122, 123 French Immersion (5, 5, 5) This "planned immersion" approach covers the equivalent of elementary French (101, 102, 103) through an alternative method with video as the central medium of presentation.

FRENCH 134 First-year Intensive French (15) Equivalent of 121, 122, 123. Not open for credit to students who have taken 102, 103, 121, 122, 123. Offered: S.

FRENCH 199 Foreign Study—Elementary (4-16) Elementary instruction in approved foreign study program. Students who wish to satisfy foreign language proficiency requirement must see the departmental adviser and may be required to take additional courses through 103.

FRENCH 201, 202, 203 Intermediate (5, 5, 5) VLPA Systematic review of French grammar. Intensive practice in writing and conversation. Readings in literature, culture, and the sciences. Prerequisites: 103 or college equivalent or placement for 201; 201 or college equivalent or placement for 202; 202 or college equivalent or placement for 203.

FRENCH 221, 222, 223 Second Year French Immersion (5, 5, 5) VLPA Cover the equivalent of second year French (FRENCH 201, 202, 203) through an alternative "planned immersion" method with video as the central medium of presentation. Prerequisites: 103, 123, 134 or equivalent for 201, 201 or 221 for 222, 222 for 223.

FRENCH 234 Intermediate French Immersion (15) VLPA Covers the equivalent of second year French (FRENCH 201, 202, 203) through an alternative "planned immersion" method with video as the central medium of presentation. Prerequisites: 103, 123, 134 or equivalent.

FRENCH 237 Foreign Study Conversational French (2-8) VLPA For participants in the Foreign Study Program. Prerequisites: 103 or college equivalent and permission of Foreign Study Office.

FRENCH 297 Foreign Study French Civilization (3/6) VLPA For participants in the Foreign Study Program. Literary tradition, social and cultural values as reflected in literature. Paper (in English) and higher degree of participation for 6 credits. In English. Prerequisites: two years of college-level French and permission of Foreign Study Office.

FRENCH 299 Foreign Study—Intermediate (4-16) VLPA Intermediate instruction in approved foreign study program. Evaluation by departmental adviser required to establish proficiency. Further study at 200-level subject to departmental evaluation.

FRENCH 301, 302, 303 Advanced French (5, 5, 5) VLPA Prerequisites: 203 or college equivalent or placement for 301; 301 for 302; 302 for 303.

FRENCH 304 Survey of French Literature: Origins to 1800 (3) VLPA Thematic and formal developments in literature of the period with emphasis on movements and texts in relation to cultural background. Prerequisites: 301.

FRENCH 305 Survey of French Literature: 1600-1789 (3) VLPA Emphasis on literary movements and texts in relation to cultural background. Prerequisites: 301.

FRENCH 306 Survey of French Literature: 1789 to the Present (3) VLPA Development of modern literature through its most important writers and movements. Prerequisites: 301.

FRENCH 308 Foreign Study Composition (3-5, max. 10) VLPA For participants in the Foreign Study Program. Compositions on topical subjects of intermediate difficulty relating to the civilization of the French-speaking countries of Europe. Grammar review as needed. Prerequisites: 203 or college equivalent and permission of Foreign Study Office.

FRENCH 313 Business Communication in French (5) VLPA Offers students the opportunity to develop French language skills (reading, writing, speaking, and listening) within the context of the French-speaking business world. Business-specific culture emphasized. Prerequisite: 301 and 302 or permission of instructor. May be taken in lieu of, or in addition to, 303.

FRENCH 323 Introduction to French Linguistics (5) VLPA Herschensohn, Klausenburger Synchronic and diachronic linguistic analysis of French, including French phonetics and phonology, morphology, syntax, and evolution of the language. Prerequisite: two years of college French.

FRENCH 327 Advanced Conversation (2, max. 8) VLPA Not open to students whose native language is French. Prerequisite: 203 or college equivalent or placement.

FRENCH 337 Foreign Study Conversational French (2-8) VLPA For participants in the Foreign Study Program. Prerequisite: 203 or college equivalent.

FRENCH 378 The Making of Contemporary France, Studied in French (5) VLPA/IS Study of the historical origins and subsequent development of contemporary problems and characteristics of French government and politics, economy, and society. Prerequisite: 203 or equivalent.

FRENCH 390 Supervised Study (2-6, max. 20) Prerequisites: permission of the instructor and the undergraduate French adviser.

FRENCH 397 Foreign Study French Civilization (3/6) VLPA For participants in the Foreign Study Program. Literary tradition, social and cultural values as reflected in literature. Paper (in French) and higher degree of participation for 6 credits. In French. Prerequisites: two years of college-level French and permission of Foreign Study Office.

FRENCH 400 The Syntactic Structure of French (5) VLPA Scientific study of the syntax of French: phrase structures and transformations (emphasis on passives, relativization, pronominalization, reflexive structures). Prerequisites: 323 or ROLING 401 or permission of instructor. Offered: jointly with FRLING 400.

FRENCH 401 The Morphological Structure of French (5) VLPA Linguistic study of French morphology. Prerequisite: 323 or ROLING 401 or permission of instructor. Offered: jointly with FRLING 401.

FRENCH 402 The Phonological Structure of French (5) VLPA The phonological component of the generative grammar of French: representations of syllabic and segmental units, phonological rules, distinctive features and their articulatory correlates. Prerequisites: 323 or ROLING 401 or permission of instructor. Offered: jointly with FRLING 402.

FRENCH 403 Background of Modern French (5) VLPA Klausenburger Linguistic analysis of the important developments in the history of the French language from its Latin origin to contemporary speech. Prerequisite: 323 or ROLING 401 or permission of instructor. Offered: jointly with FRLING 403.

FRENCH 404 Old French (5) VLPA Designed for acquisition of reading facility in Old French through intensive study of selected texts. Prerequisite: 323 or ROM 401 or permission of instructor.

FRENCH 405 Linguistics and the Teaching of French (5) VLPA Areas of linguistics that can be particularly helpful to the French teacher. Prerequisites: 323 or ROLING 401 or permission of instructor. Offered: jointly with FRLING 405.

FRENCH 406 Advanced French Grammar (5) VLPA Problems of French grammar. Differences between forms and structures of French and English. Problems of effective teaching of French. For students with at least three years of college French and for

beginning teaching assistants. Prerequisites: 303 or permission of instructor. Offered: jointly with FRLING 406.

FRENCH 409 The Phonetics of French (5) VLPA Scientific study of the French sound system with special emphasis on "lower level" phonetic rules, with integral values. Focus on data from standard French as well as socioeconomic and geographic variations. Prerequisites: 323 or ROLING 401 or LING 200 or 400 and two years of college-level French. Offered: jointly with FRLING 409.

Most of the following 400-level courses require as prerequisites FRENCH 303; 304, 305, 306. See adviser for exceptions.

FRENCH 411 Topics in the Middle Ages (5) VLPA Sixteenth-century literature with emphasis on poetry and the general artistic ambiance. Prerequisites: see note above.

FRENCH 412 Topics in Sixteenth Century French Literature (5) VLPA An introduction to major French literary texts of the Sixteenth Century. Prerequisites: 303 and 304.

FRENCH 413 Topics in Seventeenth Century (5) VLPA Seventeenth-century literature, with emphasis on the development of classicism. Prerequisites: see note above.

FRENCH 414 French Literature of the Eighteenth Century: Enlightenment (5) VLPA Eighteenth-century literature, with emphasis on the development of the Enlightenment ideology. Prerequisites: see note above.

FRENCH 415 French Literature of the Eighteenth Century: Post-Enlightenment (5) VLPA Eighteenth-century literature, with emphasis on the "dark side of the Enlightenment" and nascent romanticism. Prerequisites: see note above.

FRENCH 416 French Literature of the Nineteenth Century: Romanticism (5) VLPA Nineteenth-century literature, with emphasis on romanticism and the early manifestations of realism. Prerequisites: see note above.

FRENCH 418 French Literature of the Early Twentieth Century (5) VLPA Twentieth-century literature, with emphasis on the period 1900-1939. Prerequisites: see note above.

FRENCH 419 French Literature Since World War II (5) VLPA Twentieth-century literature, with emphasis on the period 1939 to the present. Prerequisites: see note above.

FRENCH 420 Interdisciplinary Approaches to Literature (5) VLPS Sugano Interdisciplinary studies in French literature and culture, focusing on the complex interactions of literature and other disciplines, i.e. philosophy, psychoanalysis, anthropology, architecture. Prerequisite: 303, 304, and 306.

FRENCH 421 Psychoanalysis and Literature (5) VLPA Borch-Jacobsen Readings from Freud and French critical writers regarding the relationship between psychoanalysis and literature. Prerequisites: 303 and 306.

FRENCH 422 Literature and the Other Arts (5) VLPA Examines the relationship between text and image in a variety of art forms. Prerequisites: 303.

FRENCH 424 Fiction: 1800-1850 (5) VLPA Prerequisites: see note above.

FRENCH 425 Fiction: 1850-1900 (5) VLPA Prerequisites: see note above.

FRENCH 427 Fiction: Twentieth Century (5) VLPA Prerequisites: see note above.

FRENCH 431 Critical Approaches to French Poetry (5) VLPA Interdisciplinary approaches to

French poetry focusing on the intersection of fine art, cultural movements, and the production of literature in the Second Empire and the Third Republic.

FRENCH 432 Critical Approaches to French Fiction (5) VLPA Addresses theory and practice of fiction within the context of a given century or movement. Content varies. Prerequisites: 303.

FRENCH 435 Topics in Non-Fiction (5) VLPA Content varies. Prerequisite: 303.

FRENCH 441 Québécois Literature (5) VLPA Readings of novels, plays, and occasionally, poetry. Special attention paid to how Québécois authors represent in their works the complex socio-political reality of their culture. Conducted in French. French majors required to read and write in French; all others may read and write in English. Prerequisites: 303 and 306 or permission of instructor. Offered: jointly with SISCA 441.

FRENCH 444 Poetry: Romantic (5) VLPA Prerequisites: see note above.

FRENCH 445 Women Writers and Feminist Theory (5) VLPA Focus on French women writers from different periods and places. Gender issues addressed in critical fashion, considering the different historical and ideological contexts in which each of the works were produced. Prerequisites: 303.

FRENCH 446 Poetry: Twentieth Century (5) VLPA Prerequisites: see note above.

FRENCH 450 Themes in French Literature and Culture (5) VLPA Interdisciplinary studies in French literature and culture, focusing on the construction and representation of gender roles in the French novel from the early eighteenth century. Prerequisites: 303, 304, 305, 306.

FRENCH 451 History and Literature of the French Religious Wars (5) VLPA/ISS Major political, social, and religious movements and events of, and related to, the French religious wars of 1560 to the end of the century, along with the treatment of these in the prose, poetry, and drama of the period. For students receiving French credit, readings must be done in French. Prerequisites: see note above.

FRENCH 454 Nonfiction of the Classic Period (5) VLPA Prerequisites: see note above.

FRENCH 455 One Author in French Literature/Culture (5, max. 15) VLPA In depth focus on the works of one author in French Literature or Culture. Prerequisites: 303.

FRENCH 457 One Decade in French Literature and Culture (5, max. 15) VLPA Content varies. Prerequisite: 303.

FRENCH 461 Seventeenth-Century Drama (5) VLPA Prerequisites: see note above.

FRENCH 463 Nineteenth-Century Drama (5) VLPA Prerequisites: see note above.

FRENCH 465 Twentieth-Century Drama (5) VLPA Prerequisites: see note above.

FRENCH 470 Cinema (5) VLPA Major films and figures of French cinema from the beginnings to the present. Prerequisites: see note above.

FRENCH 490 Honors Seminar (2-5, max. 10) VLPA Special studies in French literature. Required of candidates for honors and distinction in French. Open to others by permission of French honors adviser.

FRENCH 498 Poetry and Song as Elements in French Civilization (5) VLPA Relationship of poetry and music as expressed in the chanson in several

periods of French culture. Emphasis on twentieth-century poet-composer-performers. Attention given to the medieval troubadours and to poet-musician collaboration in the Renaissance and later periods. Prerequisites: see note above.

FRENCH 499 Special Topics (1-5, max. 10) Topics to meet special needs. Prerequisites: see note above.

Italian

ITAL 101, 102, 103 Elementary (5, 5, 5) Methods and objectives are primarily oral-aural. Language laboratory is required. Prerequisites: 101 or college equivalent or placement for 102; 102 or college equivalent or placement for 103.

ITAL 108 Intensive Italian Grammar and Reading (5) Intensive two-quarter presentation of Italian grammar with emphasis on reading Italian texts. For persons who require solid reading knowledge of Italian or who plan to study in Italy. Prerequisite: undergraduates—a cumulative 3.3 GPA; graduates—competence in another foreign language.

ITAL 134 Intensive First Year Italian (15) An intensive language course equivalent to 101, 102, 103, designed for highly motivated students. Not open for credit to students who have taken 102 and 103. Offered: S.

ITAL 199 Foreign Study—Elementary (4-16) Elementary instruction in approved foreign study program. Students who wish to satisfy foreign language proficiency requirement must see the departmental adviser and may be required to take additional courses through 103.

ITAL 201, 202, 203 Intermediate (5, 5, 5) VLPA Intensive speaking, reading, and writing. Functional review of grammar. Prerequisites: 103 or college equivalent or placement for 201; 201 or college equivalent or placement for 202; 202 or college equivalent or placement for 203.

ITAL 208 Intensive Italian Grammar and Reading (5) VLPA Intensive two-quarter presentation of Italian grammar with emphasis on reading Italian texts. For persons who require solid reading knowledge of Italian or who plan to study in Italy. Prerequisite: 108.

ITAL 234 Intensive Second-Year Italian (15) VLPA Intensive language course designed for highly motivated students. Equivalent to 201, 202, 203. Prerequisites: 103 or 134 or equivalent. Offered: S.

ITAL 299 Foreign Study—Intermediate (4-16) VLPA Intermediate instruction in approved foreign study program. Evaluation by departmental adviser required to establish proficiency. Further study at 200-level subject to departmental evaluation.

ITAL 301, 302 Advanced Syntax and Composition (5, 5) VLPA Prerequisites: 203 or college equivalent or placement for 301; 301 for 302.

ITAL 303 Italian Stylistics (5) VLPA Functional grammar review; creative written and oral composition and reading, with special attention to problems of style. Prerequisite: 302.

ITAL 327 Advanced Conversation (2, max. 8) VLPA Not open to students whose native language is Italian. Prerequisite: 203 or college equivalent or placement.

ITAL 390 Supervised Study (2-6, max. 20) Prerequisites: permission of the instructor and the undergraduate Italian adviser.

ITAL 400 The Development of the Italian Language (5) VLPA Historical survey of Italian phonology, morphology, and syntax. Evolution of the language is illustrated with study of pertinent documents

from various periods. Prerequisites: 301, 302, 303, LING 400, or ROLING 401 or permission of instructor. Offered: jointly with LING 419.

ITAL 401 Readings in Italian: Medieval (5) VLPA Exploration of medieval Italian cultural history through a broad variety of literary and other textual traditions. Prerequisite: undergraduate student with good reading knowledge of Italian.

ITAL 402 Readings in Italian: Early Modern (5) VLPA Exploration of early modern Italian cultural history through a variety of literary and other textual traditions. Prerequisite: undergraduate student with good reading knowledge of Italian.

ITAL 403 Readings in Italian: Modern (5) VLPA Exploration of modern Italian cultural history through a board variety of literary and other textual traditions. Limited to undergraduate students. Prerequisite: good reading knowledge of Italian.

ITAL 404, 405, 406 Survey of Italian Literature (5, 5, 5) VLPA Prerequisite: 203 or college equivalent or placement test.

ITAL 413 Literature of the Renaissance: Quattrocento (5) VLPA The early Renaissance. Humanism; writings of Lorenzo de' Medici, Poliziano, Belcari, Alberti, Masuccio, Sannazzaro, Pulci, Boiardo.

ITAL 414 Literature of the Renaissance: Cinquecento (5) VLPA The high Renaissance. Bembo and the Petrarchans, Machiavelli, Guicciardini, Castiglione, Ariosto, Guarini, Tasso.

ITAL 423 Seventeenth-Century Italian Literature (5) VLPA New sciences and new poetics: Campanella, Sarpi, Della Valle, Marino, Tesauro, Bartoli, Galileo, Redi.

ITAL 424 Eighteenth-Century Italian Literature (5) VLPA Survey of eighteenth-century literature—the melodrama, drama and poetry: Metastasio, Goldoni, Alfieri, Parini, Monti, and Foscolo. Prerequisite: 303.

ITAL 431 Italian Theater (5) VLPA The development of Italian theater from the Renaissance to the twentieth century. Prerequisite: 303.

ITAL 450 The Romantic Movement (5) VLPA Sbragia Beginning with an examination of the pre-romantic works of Ugo Foscolo, focuses on the literary and critical writings of Alessandro Manzoni and Giacomo Leopardi. Discusses the Romantic movement in Italy within the context of European Romanticism. Reference made to later variations on Romantic themes. Prerequisite: 303 or permission of instructor.

ITAL 460 Verismo (5) VLPA The development of Verismo with extensive readings from its main exponents—Capuana; Verga, Serao, Deledda, Fucini, and d'Annunzio.

ITAL 465 Contemporary Italian Narrative (5) VLPA Critical reading of selected modern exponents of the short story and novel.

ITAL 470 Dante (5) VLPA Introduction to Dante's *Commedia* and minor works, conducted in Italian. Prerequisite: 303 or permission of instructor.

ITAL 480 Proseminar in Italian Literature (3-5) VLPA Intended to help the student achieve a mature critical mastery of Italian literature. Required of Italian majors; others by permission of instructor.

ITAL 499 Special Topics (1-5, max. 10) Topics to meet special needs. Prerequisites: permission of the instructor and the undergraduate or graduate program adviser.

Courses in English

These courses are recommended as appropriate supporting studies for students majoring in other departments. Courses in English translation are not usually applicable toward undergraduate or graduate major programs in French and Italian. Majors may take any of these courses for credit as one of their electives.

French

FRENCH 458 French Art and Literature: Period Studies (5) VLPA Comparative studies of theme and technique in art and literature to illustrate major concerns of a particular period as expressed in these two media. Prerequisite: background in French literature or art history (the appropriate 300-level course in art history or the appropriate 400-level survey course in French literature).

FRENCH 481 Twentieth-Century French Novel in English (5) VLPA

FRENCH 482 French Poetry From Baudelaire to the Present in English (5) VLPA Analysis in English of the major trends and movements in modern French poetry with representative works, from Baudelaire to the poets of the 1950s.

FRENCH 483 Trends in Twentieth-Century Theatre in English (5) VLPA Study of the evolution of the French theatre from the turn of the century to the present. Special emphasis is given the French theatrical scene since World War II.

FRENCH 484 Rabelais and Montaigne in English (5) VLPA Reading and discussion of selected passages from the works of Rabelais and the essays of Montaigne. Background information through informal lectures and outside reading on the two figures as illustrative of the Renaissance in France.

FRENCH 485 Racine and Molière in English (5) VLPA

FRENCH 486 Literature of the Enlightenment in English (5) VLPA

FRENCH 487 Nineteenth-Century Fiction in English (5) VLPA

FRENCH 488 Women in French Literature in English (5) VLPA Masterpieces of French literature are read in an attempt to understand French attitudes toward women. From the sixteenth century, with a concentration on the twentieth century.

Italian

ITAL 318 Italian Literature in English (5) VLPA

ITAL 319 The Italian Short Story in English (5) VLPA The short story from the Novellino and Boccaccio to modern masters of the form. The translations are studied both as examples of narrative technique and as reflections of particular moments in Italian cultural history. Prerequisite: at least sophomore standing.

ITAL 384 Renaissance Literature of Italy in English (3) VLPA

ITAL 480 Dante's Inferno in English (5) VLPA Introduction to Dante's Inferno. Considers formal, structural, linguistic, literary, historical, cultural, philosophical, and theological issues raised by the text. Discusses the main currents of twentieth-century Dante criticism.

ITAL 481 Dante's Purgatory and Paradise in English (5) VLPA Second half of a two-quarter series. Close study of Dante's Purgatory and Paradise and retrospective reading of Inferno. Explores Dante's concept of art, both human and divine, as it is developed in and defines the poem. Prerequisite: 408 or equivalent.

ITAL 482 The Decameron in English (5) VLPA An integral reading of the Decameron, with some consid-

eration of its place in world literature and as an expression of the culture of its time. Prerequisite: upper-division standing.

Courses for Graduates Only

French

FRENCH 510 Methodology of French Language Teaching (3) Herschensohn Theoretical and practical foundation of teaching French. Major topics include modern theories of language and language acquisition which underlie modern methods of foreign language teaching, teaching techniques, testing, and classroom relations with emphasis on the multiple-approach direct method. Required for beginning French Teaching Assistants. Credit/no credit only.

FRENCH 515 French Literature of the High Middle Ages (5, max. 10) Old French literature, from the beginning to 1315. Prerequisite: permission of instructor.

FRENCH 516 Middle French Literature (5, max. 10) French literature from 1315 to 1500. Prerequisite: permission of instructor.

FRENCH 520 Renaissance Prose: Rabelais (5)

FRENCH 521 Renaissance Prose: Montaigne (5)

FRENCH 523 Studies in Fiction: 1680-1800 (5, max. 10)

FRENCH 525 Studies in Fiction: 1850-1900 (5, max. 10)

FRENCH 526 Studies in Fiction: 1900-1950 (5, max. 10)

FRENCH 530 Studies in Renaissance Poetry (5, max. 10)

FRENCH 532 Studies in Nineteenth-Century Poetry (5, max. 10)

FRENCH 534 Studies in Twentieth-Century Poetry (5, max. 10)

FRENCH 541, 542 History of the French Language (5, 5) Klausenburger Survey of the phonological, morphological, and syntactical development of the French language from its origins to the present.

FRENCH 555 French Nonfiction (5, max. 10)

FRENCH 561 Studies in Seventeenth-Century Drama (5, max. 10)

FRENCH 565 Studies in French Drama (5, max. 10) Studies in French drama, sixteenth to twentieth centuries.

FRENCH 570 Seminar in Cinema (5, max. 10) Prerequisite: permission of instructor.

FRENCH 575 Literary Criticism (5)

FRENCH 576 Critical Methodology (4) Basic scholarly tools of bibliography; historical review of literary doctrine; an introduction to critical methodology. Prerequisite: graduate standing.

FRENCH 577 Modern Critical Methods (4) Modern critical methodology and theory. Prerequisite: graduate standing.

FRENCH 580 Special Seminar and Conference (1-10, max. 30) Group seminars, or individual conferences, are scheduled under this number to meet special needs. Prerequisite: permission of the graduate program coordinator.

FRENCH 591 Literary Problems: Middle Ages (5, max. 10)

FRENCH 592 Literary Problems: Renaissance (5, max. 10)

FRENCH 593 Literary Problems: Seventeenth Century (5, max. 10)

FRENCH 594 Literary Problems: Eighteenth Century (5, max. 10)

FRENCH 595 Literary Problems: Nineteenth Century (5, max. 10)

FRENCH 596 Literary Problems: Twentieth Century (5, max. 10)

FRENCH 600 Independent Study or Research (*)

Italian

ITAL 514 Dante (5, max. 10)

ITAL 531 Italian Theater (5) The development of Italian theater from the Renaissance to the Twentieth Century. Individual conferences with lecturing professor. Prerequisite: graduate students only.

ITAL 570 Seminar in Cinema (5) Studies in various areas of Italian cinema, concentrating on major directors, critics, and movements. Prerequisite: permission of instructor.

ITAL 590 Special Seminar and Conference (1-10, max. 30) Group seminars, or individual conferences, are scheduled under this number to meet special needs. Prerequisite: permission of graduate program coordinator.

ITAL 591 Literary Problems: Middle Ages and Fourteenth Century (5, max. 10)

ITAL 592 Literary Problems: Renaissance (5, max. 10)

ITAL 593 Literary Problems: Early Modern (5, max. 10)

ITAL 594 Literary Problems: Eighteenth Century (5, max. 10)

ITAL 595 Literary Problems: Nineteenth Century (5, max. 10)

ITAL 596 Literary Problems: Twentieth Century (5, max. 10)

ITAL 600 Independent Study or Research (*)

Spanish and Portuguese Studies

C104 Padelford

Undergraduate Program

Adviser
C201 Padelford

Bachelor of Arts

Admission Requirements

Spanish: 201, 202, 203, with a minimum GPA of 2.70 and no individual grade below 2.5; 10 credits English composition with a minimum 2.5 in each course. Admission is competitive, based on the following minimum qualifications: (1) preparation for the major as indicated by student's grades in courses required for application, (2) overall scholastic record, and (3) personal statement, in English or Spanish, of interest in and commitment to the major. Other evidence reflecting the student's interest may be appended. Application deadline is the first Friday of autumn, winter, and spring quarters, for admission in the fifth week of the same quarter. Applicants denied admission may submit written petitions requesting reconsideration. Applications are available in C201 Padelford.

Major Requirements

Spanish: Minimum 53 credits above 203, including 301, 302, 303, 321, 322, 323 (LING 200 may substitute for SPAN 323); three 300-level elective courses (maximum of two from film series); four 400-level courses (one from 400 through 409). Other than 400 through 409, only one course whose instructional materials are primarily in English may apply toward the major.

Graduate Program

The Division of Spanish and Portuguese Studies offers programs of graduate study leading to the degrees of Master of Arts and Doctor of Philosophy. The Master of Arts degree normally requires two years of course work and successful completion of a comprehensive examination.

The doctorate normally requires one to two years of course work beyond the M.A., successful completion of a series of comprehensive examinations, and a dissertation.

Information on specific requirements for the various degree programs is available upon request from the office of the graduate program adviser.

Financial Aid

The department awards annually a number of teaching assistantships. The assistant normally participates in teaching three classes during the academic year. Each class is limited to approximately 25 students and meets 5 hours a week for the 10 weeks of the quarter.

Correspondence and Information

Graduate Program Adviser
C201 Padelford, Box 354360

Faculty

Chair

Farris Furman Anderson

Professors

Anderson, Farris Furman * 1967; MA, 1962, Duke University; PhD, 1968, University of Wisconsin; nineteenth- and twentieth-century Spanish literature.

Steele, Cynthia * 1986; PhD, 1980, University of California (San Diego); Latin American literature and society, narrative and feminist theory.

Associate Professors

Flores, Lauro H. * 1980; PhD, 1980, University of California (San Diego); Chicano literature, contemporary Latin-American literature (narrative).

Geist, Anthony L. * 1987; PhD, 1978, University of California (Berkeley); twentieth century Spanish literature: ideology and literary form.

O'Hara, Edgar * 1989; PhD, 1989, University of Texas (Austin); Spanish, Latin American poetry, writing poetry and essays.

Petersen, Suzanne Helen * 1973; PhD, 1976, University of Wisconsin; medieval Spanish literature.

Shipley, George A. * 1967; PhD, 1968, Harvard University; Spanish Golden Age.

Assistant Professor

Penna, Camillo * 1992; PhD, 1992, University of California (Berkeley); Brazilian women writers, Latin American nationalism, philosophy, literary theory, film.

Lecturer

Tamburo, Carolyn R. 1993; PhD, 1986, University of California (Los Angeles); foreign language pedagogy

and teacher training; director of second year language program.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

Portuguese

PORT 101, 102, 103 Elementary (5, 5, 5) Methods and objectives are primarily oral-aural. Covers all major elements of Portuguese grammar. Prerequisites: 101 or college equivalent or placement for 102; 102 or college equivalent or placement for 103.

PORT 105 Intensive Portuguese for Spanish Speakers (6) Covers the verbal system and major grammatical points. Does not satisfy Foreign Language Requirement. Prerequisite: two college years of Spanish or equivalent.

PORT 201, 202, 203 Intermediate (5, 5, 5) VLPA Modern texts, composition, conversation, and a systematic review of grammar. Prerequisites: 103 or equivalent or permission of instructor for 201; 201 for 202; 202 for 203.

PORT 301, 302 Grammar and Lexicon (5, 5) VLPA Prerequisites: 203 for 301; 301 for 302.

PORT 310 Introduction to Lusophone Literature (3) VLPA Introduction to the studies of Lusophone literature and culture.

PORT 335 Twentieth Century Brazilian Fiction in English (5, max. 10) VLPA Penna Reading texts in connection with cultural and theoretical issues.

Spanish

Credit: The sequence 121, 122, 123 is parallel to 101, 102, 103; students can receive credit for 101 and 121 but not for 102 and 122 or 103 and 123. 101 or 121 cannot be taken for credit after 102, 103, 122, or 123. 134 is a 15-credit intensive course exactly equivalent to 121, 122, 123; a maximum of fifteen credits are allowed for 134 and any of 102, 103, 121, 122, and 123. A student who completes 134 cannot later take 101 for credit, but a student who earns credit for 101 first can take 134 for fifteen additional credits.

SPAN 101, 102, 103 Elementary (5, 5, 5) Methods and objectives are primarily oral-aural. Language laboratory is required. Prerequisites: 101 or college equivalent or placement for 102; 102 or college equivalent or placement for 103.

SPAN 104 Spanish Grammar—Intensive (5) Thorough review of the basics of Spanish grammar. Not open to students who have taken 102 or 103. Prerequisite: one year pre-university Spanish, or 101, or permission of instructor.

SPAN 121, 122, 123 Spanish Immersion (5, 5, 5) Covers the equivalent of elementary Spanish (SPAN 101, 102, 103) through an alternative "planned immersion" method with video as the central medium of presentation. Prerequisites: 101 or 121 for 122, 122 for 123.

SPAN 134 Intensive First-Year Spanish (15) Equivalent of 121, 122, 123. Employs "planned immersion" method with video as the central medium of presentation. Not open for credit to students who have taken 121, 122, 123 or 102, 103. Offered: S.

SPAN 199 Foreign Study—Elementary (4-16) Elementary instruction in approved foreign study program. Students who wish to satisfy foreign language proficiency requirement must see the departmental adviser and may be required to take additional courses through 103.

SPAN 201, 202, 203 Intermediate (5, 5, 5) VLPA Intensive practice in speaking, reading, and writing. Review of Spanish grammar. Oral practice based on literary and cultural readings. Prerequisites: 103 or college equivalent or placement for 201; 201 or college equivalent or placement for 202; 202 or college equivalent or placement for 203.

SPAN 204 Intensive Spanish Review—Intermediate (5) VLPA Intensive review of grammar, reading composition. For highly motivated students with at least one year of college Spanish, or equivalent. Synthesis of 201, 202, 203, and preparation for third-year work in language and literature. Prerequisites: 103, 104, or 201; or four years of high school Spanish.

SPAN 299 Foreign Study—Intermediate (4-16) VLPA Intermediate instruction in approved foreign study program. Evaluation by departmental adviser required to establish proficiency. Further study at 200-level subject to departmental evaluation.

SPAN 301, 302 Grammar and Lexicon (5, 5) VLPA Prerequisites: 203 for 301; 301 for 302.

SPAN 303 Introduction to Stylistics Through Composition (5) VLPA Prerequisite: 302.

SPAN 304 Survey of Spanish Literature: 1140-1498 (3) VLPA Masterpieces of Spanish literature from origins to 1498. Prerequisites: 301 which may be taken concurrently.

SPAN 305 Survey of Spanish Literature: 1498-1681 (3) VLPA Prerequisites: 301 which may be taken concurrently.

SPAN 306 Survey of Spanish Literature: 1681 to the Present (3) VLPA Prerequisites: 301 which may be taken concurrently.

SPAN 307 Introduction to Latin American Literature (3) VLPA Study of selected works of twentieth-century Latin American literature and their sociohistorical context. Development of reading and writing skills. Prerequisites: 301 which may be taken concurrently.

SPAN 313 Business Communication in Spanish (5) VLPA This intermediate level course offers students the opportunity to develop their Spanish language skills (reading, writing, speaking, and listening) within the context of the Spanish-speaking business world. Business-specific culture emphasized. Prerequisites: 301 which may be taken concurrently.

SPAN 321 Introduction to Hispanic Literary Studies (3) VLPA Acquaints the third-year student with elementary techniques of literary analysis, as applied to examples of narrative, poetry and theater, within the context of the Spanish and Latin American literary traditions. Prerequisite: 301 which may be taken concurrently.

SPAN 322 Introduction to Hispanic Cultural Studies (3) VLPA Introduces students to elite, mass, and folk cultures of Spain, Latin America, and Hispanic peoples of the United States. Readings vary according to the faculty member's expertise and interests. Prerequisites: 301 which may be taken concurrently.

SPAN 323 Introduction to Spanish Linguistics (3) VLPA Synchronic and diachronic linguistic analysis of Spanish, including Spanish phonetics and phonology, morphology, syntax, and evolution of the language. Prerequisites: 301 which may be taken concurrently.

SPAN 331 Themes in Mexican-American Studies (5) VLPA Flores Examination of significant historical and cultural themes of the Mexican-American experience. Prerequisite: speaking knowledge of Spanish.

SPAN 332 Chicano Film and Narrative (5) VLPA Flores Historical overview of the evolution of Chicano culture through film. Critical examination of the por-

trayal and self-portrayal of Chicanos in film and selected works of narrative. Prerequisite: 301 which may be taken concurrently or equivalent.

SPAN 334 Latin American Film (5) VLPA Cultural studies through fictional films, documentaries, and literature. Theories of representation and subjectivity; cinema and underdevelopment. Prerequisite: 301 which may be taken concurrently or equivalent.

SPAN 337 Foreign Study Conversational Spanish (2-6) VLPA For participants in the Foreign Study Program. Prerequisites: 203 or equivalent and permission of Foreign Study Office.

SPAN 350 Drama (3) VLPA Generic study of Spanish drama. Prerequisites: 301 which may be taken concurrently.

SPAN 351 Poetry (3) VLPA Generic study of Spanish poetry. Prerequisites: 301 which may be taken concurrently.

SPAN 352 Fiction (3) VLPA Generic study of Spanish fiction. Prerequisite: 301 which may be taken concurrently.

SPAN 376 Introduction to Latin American Poetry (3) VLPA *O'Hara* Traces the oral, musical, and written traditions of Latin American poetry. Prerequisite: 301 which may be taken concurrently.

SPAN 390 Supervised Study (2-6, max. 20) Prerequisites: permission of the instructor and undergraduate Spanish adviser.

SPAN 393 Foreign Study (2-10, max. 20) VLPA Study in Spanish speaking country outside the standard Spanish curriculum of the University of Washington. Prerequisites: 301, 302, and approval of Foreign Study Office or undergraduate adviser.

SPAN 400 The Syntactic Structure of Spanish (5) VLPA *Strozer, Zagana* Scientific study of the syntax of Spanish: structure of phrases, transformationally derived structures, grammatical relations, principles of interpretation. Prerequisites: 303 and 323. Offered: jointly with SPLING 400.

SPAN 401 The Morphological Structure of Spanish (5) VLPA *Strozer, Zagana* Principles of word formation, including derivational and inflectional morphology. Relationship between inflectional morphology and other components of grammar. Prerequisites: 303 and 323. Offered: jointly with SPLING 401.

SPAN 402 The Phonological Structure of Spanish (5) VLPA *Strozer, Zagana* Phonological component of the generative grammar of Spanish; representations of syllabic and segmental units, phonological rules, distinctive features and their articulatory correlates. Prerequisites: 303 and 323. Offered: jointly with SPLING 402.

SPAN 403 The Evolution of the Spanish Language (5) VLPA *Zagana* Historical survey of Spanish phonology, morphology, and syntax, from Latin origins to the modern language. Prerequisites: 303 and 323. Offered: jointly with SPLING 403.

SPAN 406 Advanced Spanish Grammar (5) VLPA *Anderson* Problems of Spanish grammar. Differences from English grammar. Techniques for the effective teaching of Spanish. Prerequisites: 303 and 323. Offered: jointly with SPLING 406.

SPAN 408 Spanish Translation Workshop (5) VLPA *Anderson* Intensive practice in translation to and from Spanish. Texts include literary prose, poetry, expository writing, newspaper and magazine articles. Problems of standard versus colloquial language, transposition of cultural references, concept of fidelity in translation. Prerequisites: 303 and 323. Recommended: 406.

SPAN 409 Spanish Phonetics (5) VLPA Analysis of sounds: training in pronunciation, intonation, and close transcription of Spanish language in its modalities.

Prerequisite: 302 or graduate standing. Offered: jointly with SPLING 409.

Spanish majors must complete 303, 321, 322 and at least two 300-level electives beyond 303 before taking 400-level Spanish literature courses (SPAN 415-493).

SPAN 415 Spanish Literature: Nineteenth Century (5) VLPA *Anderson* Prerequisites: 303, 321, plus one additional 300-level course beyond 303.

SPAN 416 Spanish Literature: 1900-1936 (5) VLPA Spanish literature of the twentieth century prior to the Civil War (1900-1936). Concentration on Generations of 1898 and 1927. Prerequisites: 303, 321, plus one additional 300-level course beyond 303.

SPAN 417 Spanish Literature From 1940 to the Present (5) VLPA Prerequisites: 303, 321, plus one additional 300-level course beyond 303.

SPAN 420 Spanish Poetry: Origins Through the Fifteenth Century (5) VLPA Prerequisites: 303, 321, plus one additional 300-level course beyond 303.

SPAN 423 Spanish Poetry: The Golden Age, Sixteenth Through Seventeenth Centuries (5) VLPA Prerequisites: 303, 321, plus one additional 300-level course beyond 303.

SPAN 424, 425, 426 Hispanic Poetry (5, 5, 5) VLPA *Geist* Modern lyric poetry of the Hispanic world. The period studied extends from 1870 to 1936 and deals with thirteen major poets, from Becquer to Hernandez. Prerequisites: 303, 321, plus one additional 300-level course beyond 303.

SPAN 433 Golden Age Prose (5) VLPA *Shipley* Representative, and outstanding, prose works of sixteenth- and seventeenth-century Spain. Prerequisites: 303, 321, plus one additional 300-level course beyond 303.

SPAN 436 Spanish Novel of the Nineteenth Century (5) VLPA *Anderson* Representative works of Galdos, Clarin, Pereda, Valera, and Blasco Ibanez. Prerequisites: 303, 321, plus one additional 300-level course beyond 303.

SPAN 437 Spanish Novel: 1900-1936 (5) VLPA Spanish novel from the generation of 1898 to the beginning of the Civil War (1936). Prerequisites: 303, 321, plus one additional 300-level course beyond 303.

SPAN 438 Spanish Novel: 1939 to the Present (5) VLPA Prerequisites: 303, 321, plus one additional 300-level course beyond 303.

SPAN 439 Women Writers (5) VLPA/I&S Feminist analysis of selected texts by Chicana/Latina writers in the United States as well as by Spanish-American, Luso-Brazilian and/or Spanish women writers in their specific socio-historical contexts. Prerequisites: 303, 322, and one additional 300-level course beyond 303, or permission of instructor. Offered: jointly with WOMEN 439.

SPAN 440 Spanish Drama: 1150-1600 (5) VLPA From the beginning to Lope de Vega. Prerequisites: 303, 321, plus one additional 300-level course beyond 303.

SPAN 441 Spanish Drama: 1600-1835 (5) VLPA Spanish theatre of the seventeenth century, with emphasis on Lope de Vega. Prerequisites: 303, 321, plus one additional 300-level course beyond 303.

SPAN 445 The Modern Theatre in Spain, 1700-1900 (5) VLPA *Anderson* Literature and historical context of Spain's theatre in the eighteenth and nineteenth centuries. Prerequisites: 303, 321, plus one additional 300-level course beyond 303.

SPAN 446 The Modern Theatre in Spain, 1900-1936 (5) VLPA *Anderson* Major currents and literature of Spain's theatre in this century, up to the Spanish Civil War in 1936. Prerequisites: 303, 321, plus one additional 300-level course beyond 303.

SPAN 447 Spanish Theatre Since the Civil War (5) VLPA Works of Spain's major dramatists of the post-war period. Special attention given to the social and political context of the theatre in Spain under the Franco regime. Prerequisites: 303, 321, plus one additional 300-level course beyond 303.

SPAN 449 Spanish Drama and Play Production (5, max. 10) VLPA *Anderson* Prerequisite: permission of instructor.

SPAN 453 Cervantes and His Times (5) VLPA *Shipley* Study of Cervantes and his moment in Spanish history, with special attention to his cultural and artistic environment. Prerequisites: 303, 321, plus one additional 300-level course beyond 303.

SPAN 461 Cultural Background of Latin American Literature (5) VLPA Survey of ideas and art forms and their relationship to literature in four periods: pre-Columbian, colonial, early independence, and twentieth century. Prerequisites: 303, 322, plus one additional 300-level course beyond 303.

SPAN 462 Early Spanish Civilization (5) VLPA Development of Spanish society and art forms from early times to 1700. Prerequisites: 303, 322, plus one additional 300-level course beyond 303.

SPAN 463 Spanish Civilization Since 1700 (5) VLPA Spanish civilization and its major artistic products since 1700. Major moments in the development of Spanish society and intellectual life as reflected in music, painting, and especially literature. Prerequisites: 303, 322, plus one additional 300-level course beyond 303.

SPAN 464 Chicana Expressive Culture (5) VLPA/I&S Expressive culture of Mexican women in United States. Cultural and artistic practices in home, film, literary (print, oral) performing and visual arts. Focuses on ways Chicana visual artists re-vision traditional iconography. Prerequisites: 303, 322, one additional 300-level course beyond 303 or permission of instructor. Offered: jointly with CHSTU 464/WOMEN 464.

SPAN 465 Contemporary Chicano Literature (5) VLPA Examination of one or more problems, themes, and/or figures in the developing body of Chicano literature. Prerequisites: 303, 322, plus one additional 300-level course beyond 303.

SPAN 468 Chicano Literature: Fiction (5) VLPA Nineteenth- and early twentieth-century fiction, as well as contemporary works, are examined in attempts to trace the development of Chicano fiction in the proper historical trajectory. Prerequisites: 303, 321 or 322, plus one additional 300-level course beyond 303.

SPAN 467 Spanish Women (5) VLPA/I&S Women's culture in Spain, focusing on women's experience during Civil War; persecution and censorship of women activists, artists, intellectuals during Franco years; changes in women's culture brought about by reintroduction of democracy; major issues addressed by contemporary Spanish feminists. Prerequisites: 303, 322, and one additional 300-level course beyond 303, or permission of instructor. Offered: jointly with WOMEN 467.

SPAN 468 Latin American Women (5) VLPA/I&S Issues in women's culture from various Latin American countries, social classes, ethnic groups. Includes female creativity, relationship between female artists and the male tradition, women's exploitation of women, relationship of middle-class to popular feminism, connections between feminism and social change. Prerequisites: 303, 322, and one additional 300-level course beyond 303. Offered: jointly with WOMEN 468.

SPAN 473 Latin American Fiction: Nineteenth Century (5, max. 15) VLPA Study of prose fiction in Latin America in the nineteenth century. Prerequisites: 303, 321, plus one additional 300-level course beyond 303.

SPAN 474 Latin American Fiction: Twentieth Century (5) VLPA Prerequisites: 303, 321, plus one additional 300-level course beyond 303.

SPAN 475 Latin American Poetry: Colonial Through Nineteenth Century (5) VLPA Poetic movements of the seventeenth, eighteenth, and nineteenth centuries in Spanish American, Renaissance, baroque, neoclassicism, romanticism, and modernism. Prerequisites: 303, 321, plus one additional 300-level course beyond 303.

SPAN 476 Contemporary Latin American Poetry (5) VLPA Evolution of Latin American poetry, from postmodernism and vanguardism to the most recent poetic expression. Prerequisites: 303, 321, plus one additional 300-level course beyond 303.

SPAN 477 Latin American Essay (5) VLPA Literary expression of ideas in Latin American countries, nineteenth and twentieth centuries. Prerequisites: 303, 321, plus one additional 300-level course beyond 303.

SPAN 478 Modern Latin American Theater (5) VLPA Study of the origin, development, and achievements of Latin American theater with an overview of its history prior to the twentieth century. Prerequisites: 303, 321, plus one additional 300-level course beyond 303.

SPAN 480 Spanish Medieval Literature (5) VLPA Principal literary works of the Spanish Middle Ages in the context of evolving intellectual, spiritual, and artistic climates of the period. Covers the evolution of narrative and lyric prose and verse in both their traditional and learned manifestations. Prerequisites: 303, 321, and one additional 300-level course beyond 303.

SPAN 481 Sixteenth- and Seventeenth-Century Spanish Literature (5) VLPA Spanish literature of the sixteenth and seventeenth centuries. Close study of key texts from all genres as well as their socio-historical contexts. Prerequisites: 303, 321, and one additional 300-level course beyond 303.

SPAN 482 Eighteenth- through Twentieth-Century Spanish Literature (5) VLPA Survey of Spanish literature since 1700, and its historical context. Prerequisites: 303, 321, and one additional 300-level course beyond 303.

SPAN 483 Latin American Literature: Origins to Independence (5) VLPA Principal literary movements of Latin America, fifteenth through nineteenth centuries; native American cultures, chronicles of the Spanish conquest and resistance, colonial Baroque, Independence movement, romanticism and naturalism. Includes the definition of genres and of American cultural identity within a dependent context. Prerequisites: 303, 321, and one additional 300-level course beyond 303.

SPAN 484 Latin American Literature: Modernismo to the Present (5) VLPA Principal literary movements of Latin America, late nineteenth century to the present, with particular emphasis on poetry and narrative: modernismo, postmodernismo, the vanguard, nueva and novísima narrativa. Includes essays and autobiographical writings to help place the literary works in socio-historical perspective. Prerequisites: 303, 321, and one additional 300-level course beyond 303.

SPAN 485 Cultural Studies of Latin America (5) VLPA/IS Interdisciplinary exploration of connections among culture, identity, and power, and among popular, mass, and elite cultures in one or more regions of Latin America. Specific topics vary, but may include such problems as tradition, modernity, and postmodernism or national and resistance cultures. Offered: jointly with SISLA 485.

SPAN 486 Photography and Cultural Studies in Latin America (5) VLPA/IS Interdisciplinary explo-

ration of the connections between visual anthropology (ethnography through photography and film), documentary and art photography, and colonial and post-colonial discourse in Latin America during the twentieth century. Prerequisite: permission of departmental adviser. Offered jointly with SISLA 486.

SPAN 490 Honors Seminar (2-5, max. 10) VLPA Special studies in Spanish literature. Required of candidates for Honors and Distinction in Spanish.

SPAN 491 Individual Authors and Special Topics in Spanish Literature (5, max. 10) VLPA Focus on an individual Spanish author or a special problem in Spanish literature. Prerequisites: 303, 321, plus one additional 300-level course beyond 303.

SPAN 493 Foreign Study (2-10, max. 20) VLPA Advanced study in Spanish speaking country outside the standard Spanish curriculum of the University of Washington. Prerequisites: 303, 321, and one 300-level course above 303.

SPAN 495 Study in Spain (12) VLPA One-quarter study group in Spain. Course content varies from year to year. Consult the Department of Romance Languages and Literature for availability and further requirements.

SPAN 499 Special Topics (1-5, max. 10) Topics to meet special needs. Prerequisites: permission of instructor and undergraduate adviser or graduate program coordinator.

Courses in English

These courses are recommended as appropriate supporting studies for students majoring in other departments. Courses in English translation are not usually applicable toward undergraduate or graduate major programs in the Department of Romance Languages and Literature. Majors may take any of these courses for credit as one of their electives.

SPAN 317 Spanish Masterworks in English Translation (5) VLPA Spanish literary masterpieces of the twelfth to sixteenth centuries, in English translation, with consideration of their background and influence.

SPAN 318 Spanish Masterworks in English Translation (5) VLPA Spanish literary masterpieces of the seventeenth to twentieth centuries, in English translation, with consideration of their background and influence.

SPAN 320 Contemporary Latin American Literature in English Translation (3) VLPA Flores, Steele Selected texts of contemporary Latin American literature, including examples of magical realism, the New Novel, and Central American poetry, in their socio-historical context.

SPAN 339 Women Writers in English Translation (3) VLPA Feminist analysis of selected contemporary texts in English or English translation by Chicana/Latina writers in the United States; or by Spanish-American, Luso-Brazilian and/or Spanish women writers, in their specific socio-historical context. Offered: jointly with WOMEN 339.

SPAN 353 Cervantes' Don Quixote in English (5) VLPA Shipley Cervantes's Don Quixote de la Mancha: close study of this comic masterpiece, and the life, times, and works of its author. Consideration of the work's enduring influence and vitality.

Courses for Graduates Only

Romance Literature

ROMAN 593 Literary Problems: Early Modern Period (5)

ROMAN 596 Problems in Comparative Contemporary Literary Studies (5) Seminar exploring contem-

porary literary thought through theoretical and/or creative literature. A selection of texts from at least two Romance languages and literary traditions. Prerequisites: competence in at least two Romance languages; completion of several upper division literature courses; some familiarity with critical methodologies.

ROMAN 600 Independent Study or Research (*) Credit/no credit only.

ROMAN 700 Master's Thesis (*) Credit/no credit only.

ROMAN 800 Doctoral Dissertation (*) Credit/no credit only.

Spanish

SPAN 510 Methodology of Spanish Language Teaching (3) Theoretical and practical foundation for teaching Spanish. Major topics include modern theories of language and language acquisition which underlie modern methods of foreign language teaching, teaching techniques, testing, classroom relations. Emphasis on the multiple-approach direct method. Required for beginning Spanish Teaching Assistants. Credit/no credit only.

SPAN 521, 522 The Renaissance in Spain (5, 5) Literary creation and the cultural, social, historical context of Spanish literature from La Celestina through the sixteenth century. Extensive study of secondary materials, intensive analysis of representative literary texts.

SPAN 541, 542 History of the Spanish Language (5, 5) Summary of the evolution of Spanish language from the fragmentation of Peninsular Romance to Cantar de Mio Cid. The main work consists of analysis of early Castilian texts.

SPAN 561 Spanish-American Novel From 1940 to the Present (5)

SPAN 571 The Modern Essay in Spanish America (5)

SPAN 572 Twentieth-Century Spanish Poetry (5, max. 10)

SPAN 573 Twentieth-Century Spanish-American Poetry (5, max. 10)

SPAN 590 Special Seminar and Conference (1-10, max. 30) Group seminars, or individual conferences, are scheduled under this number to meet special needs. Prerequisite: permission of the graduate program coordinator.

SPAN 591 Literary Problems: Middle Ages (5, max. 10)

SPAN 592 Literary Problems: Renaissance (5, max. 10)

SPAN 593 Literary Problems: Golden Age (5, max. 10)

SPAN 594 Literary Problems: Eighteenth Century (5, max. 10)

SPAN 595 Literary Problems: Nineteenth Century (5, max. 10)

SPAN 596 Literary Problems: Twentieth Century (5, max. 10)

SPAN 597 Literary Problems: Spanish-American Colonial Literature (5, max. 10)

SPAN 598 Literary Problems: Latin America (5, max. 10)

SPAN 600 Independent Study or Research (*)

Russian, East European, and Central Asian Studies

See International Studies.

Scandinavian Languages and Literature

318 Raitt

The Department of Scandinavian Languages and Literature is concerned with the study of languages, literature, history, politics, and cultures of Denmark, Finland, Iceland, Norway, and Sweden. Emphasis is placed both on contemporary literature and culture and on their historical development. Although most courses designed for majors are taught in the original languages, a broad spectrum of courses designed primarily for nonmajors is offered in English.

Undergraduate Program

Adviser
Lotta Gavel Adams
305P Raitt
543-0643
email: lotta@u.washington.edu

Bachelor of Arts

Major Requirements

Danish, Norwegian, or Swedish: At least 65 credits, of which 35 are in upper-division courses. The 65 credits include 30 credits in first- and second-year language training, 15 credits in literature courses in the chosen language, one course in Scandinavian area studies, a course in the history of Scandinavian languages, a course in Scandinavian literature in translation, and a senior essay.

Scandinavian Area Studies: 65 credits, of which 35 are in upper-division courses. The 65 credits include 30 credits in the chosen Scandinavian language (normally first and second year), a minimum of one course from each of four area studies fields (Scandinavian folklore and popular culture, literature, history, society and politics), and a senior essay.

Minor

Minor Requirements

Danish, Norwegian, or Swedish: 35 credits to include 15 credits of second-year language; 10 credits in literature courses in the chosen language; 10 credits of additional course work (minimum 5 credits at the 300 level or above) from the fields of Scandinavian folklore and popular culture, literature, history, society and politics.

Finnish: 35 credits to include 20 credits of language training; SCAND 340 (or approved substitute); and 10 credits of additional course work at the 300 level or above from the fields of Scandinavian folklore and popular culture, literature, history, society and politics.

Scandinavian Area Studies: 35 credits to include 15 credits of second-year language courses in Danish, Finnish, Norwegian, or Swedish; 20 credits of additional course work (minimum 15 credits at the 300 level or above) in two of the following fields: Scandinavian folklore and popular culture, literature, history, society and politics.

Graduate Program

Thomas DuBois, Graduate Program Coordinator
543-6099
email: tdubois@u.washington.edu

The Department of Scandinavian Languages and Literature offers graduate programs of study leading to the Master of Arts and Doctor of Philosophy degrees. For the M.A. degree, the emphasis may be placed on Old Icelandic (Old Norse), Danish, Norwegian, Swedish, or Scandinavian area studies. Each aspirant for the Ph.D. degree must complete one year's study of Old Icelandic and concentrate his or her studies primarily within one of four areas: Danish language and literature, Norwegian language and literature, Swedish language and literature, or Scandinavian philology and linguistics.

For the graduate student, the programs in Scandinavian languages and literature open several interesting areas of study: medieval, with extensive study of Old Scandinavian languages and literature, particularly Old Icelandic; modern, including (1) the eighteenth century, represented by writers such as Holberg and Bellman; (2) romanticism; (3) Ibsen, Strindberg, and their contemporaries; and (4) the twentieth century, represented by such figures as Dinesen, Hamsun, and Lagerkvist. Major attention is paid to the history of the Scandinavian languages, prose fiction, drama, and poetry. Opportunities for supervised study and specialization also exist in such areas as Scandinavian history, politics, mythology, and folklore. There are also opportunities for comparative literature study.

Master of Arts

For the M.A. degree, two options are available, each allowing the student to emphasize a target language while pursuing courses in Scandinavian languages, literature, or area studies.

1. An emphasis on Scandinavian languages and literature includes acquisition of a working knowledge of the methods of philology and literary history, theory and analysis, plus study of one secondary area.

2. An emphasis on Scandinavian area studies includes the study of Scandinavian folklore, mythology, history, politics, and society, with an emphasis in one of these areas.

Admission Requirement: Bachelor of Arts degree with major in Danish, Finnish, Norwegian, Swedish, or Scandinavian area studies, or equivalent background.

Graduation Requirements: Minimum of 40 credits in courses or seminars in Scandinavian and related subjects approved by the department, of which at least 20 credits must be in courses numbered 500 and above; reading knowledge of French or German (another non-Scandinavian language may be substituted with faculty approval); written and oral examination; option between thesis and nonthesis program. Candidates in Scandinavian languages and literature must satisfy the departmental requirements in Old Icelandic.

Doctor of Philosophy

For the Ph.D. degree, the student concentrates primarily on one of two areas: Scandinavian languages and literature or Scandinavian philology and linguistics, with an emphasis on the student's chosen target language. Major attention is given to the history of the Scandinavian languages, literary theory and genre study, and Scandinavian literary history. Opportunities for graduate work also exist in such areas as Scandinavian history, politics, mythology, and folklore.

Admission Requirement: Master of Arts degree with major in Scandinavian languages and literature or equivalent background.

Graduation Requirements: 36 credits beyond the master's degree in courses or seminars in Scandi-

nian languages and literature and related subjects approved by the department; one year's study of Old Icelandic; a reading knowledge of French and German (other non-Scandinavian languages may be substituted with faculty approval); General Examination for admission to candidacy; 27 credits of SCAND 800 (Dissertation) taken over at least three quarters and a Final Examination on the dissertation.

Financial Aid

Teaching assistantships in Danish, Norwegian, and Swedish are available, as well as occasional research assistantships.

Correspondence and Information

Graduate Program Coordinator
318 Raitt, Box 353420

Faculty

Chair

Terje I. Leiren

Professors

Nyberg, Folke E. * 1969, (Adjunct); MArch, 1960, Yale University; theory, urban design, professional practice.

Rossel, Sven H. * 1974; PhD, 1968, University of Copenhagen (Denmark); Danish language and literature, medieval literature; European preromanticism, romanticism, symbolism.

Steen, Birgitta * 1973, (Emeritus); PhD, 1960, University of Washington; Scandinavian drama and film, children's literature, comparative literature.

Associate Professors

Conroy, Patricia L. * 1972; PhD, 1974, University of California (Berkeley); Scandinavian philology, Icelandic language and literature, Danish, Faroese.

Leiren, Terje I. * 1977; PhD, 1978, North Texas State University; Scandinavian history, nationalism, immigration, ethnicity, Norwegian language.

Remley, Paul G. * 1988, (Adjunct); PhD, 1990, Columbia University; Old and Middle English, medieval languages and literatures, critical theory.

Sehmsdorf, Henning K. * 1967, (Emeritus); PhD, 1968, University of Chicago; folklore and mythology, Norwegian language and literature, comparative literature.

Sjåvik, Jan * 1978; PhD, 1979, Harvard University; Norwegian language and literature, prose fiction, literary theory.

Warme, Lars G. * 1975, (Emeritus); PhD, 1974, University of California (Berkeley); Swedish language and literature, Scandinavian novel, comparative literature.

Assistant Professors

DuBois, Thomas A. * 1990; PhD, 1990, University of Pennsylvania; Nordic and North American folkloristics, Finnish, Sami, women's culture, adolescence.

Eliason, Leslie Carol * 1988, (Adjunct); MA, 1985, PhD, 1988, Stanford University; comparative politics, European public policy, comparative education and health care policy.

Gavel-Adams, Ann-Charlotte * 1986; PhD, 1990, University of Washington; August Strindberg, Scandinavian women's literature, Scandinavian turn-of-the-century drama and art.

Ingebrigt, Christine * 1992; PhD, 1993, Cornell University; Scandinavian domestic and foreign policies, European community integration and Scandinavia.

Stecher Hansen, Marianne T. * 1988; MA, 1981, University of Washington; PhD, 1990, University of California (Berkeley); Danish language and literature, Scandi-

navian novel, Isak Dinesen (Karen Blixen), H.C. Anderson.

Lecturer

Brandl, Klaus K. * 1991; PhD, 1991, University of Texas (Austin); foreign language pedagogy, computer assisted language learning, applied linguistics.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

Danish

DANISH 101, 102, 103 Elementary Danish (5, 5, 5) Fundamentals of oral and written Danish.

DANISH 201, 202, 203 Second Year Danish (5, 5, 5) VLPA Intensive practice in speaking, reading, and writing. Review of grammar. Introduction of modern literary texts. Discussion of culture and current events in Denmark. Prerequisite: 103 or equivalent.

DANISH 310 The Danish Short Story (5) VLPA Tales and stories by H. C. Andersen and Karen Blixen as well as Blicher, Jacobsen, Pontoppidan, Bang, Seeborg, and Sørensen. Prerequisite: 203 or equivalent.

DANISH 311 Topics in Danish Literature and Culture (5) VLPA Selected topics in modern Danish literature and culture, such as women's literature, Danish identity and the European Union, contemporary drama and film, or children's literature. Prerequisite: 203 or equivalent.

DANISH 312 The Danish Novel (5) VLPA Selected Danish novels since the Modern Breakthrough. Works by Jacobsen, Bang, Jensen, Kirk, Blixen, Scherfig, Ditlevsen, and Riibjerg. Prerequisite: 203 or equivalent.

DANISH 490 Supervised Reading (* max. 10) Readings in a selected area of Danish language, literature, or related fields. Prerequisite: permission of instructor.

Finnish

FINN 101, 102, 103 Elementary Finnish (5, 5, 5) Fundamentals of oral and written Finnish.

FINN 200 Continuing Finnish (5, max. 15) VLPA Focuses on a rotating topic, e.g., Finnish folklore, minorities, literature, history, with strong emphasis on reading, writing and discussion. Prerequisite: 103 or equivalent.

Lithuanian

LITH 101, 102, 103 Elementary Lithuanian (5, 5, 5) Fundamentals of oral and written Lithuanian.

Norwegian

NORW 101, 102, 103 Elementary Norwegian (5, 5, 5) Fundamentals of oral and written Norwegian.

NORW 201, 202, 203 Second-Year Norwegian (5, 5, 5) VLPA Intensive practice in speaking, reading, and writing. Functional review of grammar. Prerequisites: 103 or equivalent.

NORW 310 The Norwegian Short Story (5) VLPA Generic study of the Norwegian short story. Prerequisite: 203 or equivalent.

NORW 311 Drama After Ibsen (5) VLPA Prerequisite: 203 or equivalent.

NORW 312 Topics in Norwegian Literature and Culture (5, max. 15) VLPA Topics related to Norwegian literature, life, and civilization. Prerequisite: 203 or equivalent.

NORW 321 The Plays of Henrik Ibsen (5) VLPA Study of selected plays of Ibsen. Prerequisite: 203 or equivalent.

NORW 490 Supervised Reading (* max. 10) Readings in a selected area of Norwegian language, literature, or related fields. Prerequisite: permission of instructor.

Swedish

SWED 101, 102, 103 Elementary Swedish (5, 5, 5) Fundamentals of oral and written Swedish.

SWED 150 Intensive First-year Swedish (15) Fundamentals of oral and written Swedish. Intensive practice in speaking, reading, and writing. Interactive classroom, computer-assisted learning, language and reading laboratories. Emphasis on contemporary Swedish culture and society.

SWED 201, 202, 203 Second-year Swedish (5, 5, 5) VLPA Intensive practice in speaking, reading, and writing. Functional review of grammar. Prerequisites: 103 or equivalent.

SWED 300 Swedish Women Writers (5) VLPA Readings from works by Swedish women writers. Prerequisite: 203 or equivalent.

SWED 301 Topics in Swedish Literature and Culture (5, max. 15) VLPA Topics in Swedish literature, life, and civilization. Prerequisite: 203 or equivalent.

SWED 302 The Swedish Novel (5) VLPA Selected works by novelists of the nineteenth and twentieth centuries. Prerequisite: 203 or equivalent.

SWED 352 Strindberg and His Works (5) VLPA Representative short stories, dramas, autobiographical works, poems, and one novel. Prerequisite: 203 or equivalent.

SWED 490 Supervised Reading (* max. 12) Readings in a selected area of Swedish language, literature, or related fields. Prerequisite: permission of instructor.

Scandinavian

Courses in English

SCAND 100 Introduction to Scandinavian Culture (2) VLPA/I&S The Scandinavian experience from the Viking Age to the present day; the background for contemporary Scandinavian democracy, with major emphasis on the cultural, political, and religious development of the Scandinavian countries. 2.5 credits available Summer Quarter only.

SCAND 200 Contemporary Scandinavian Society (5) I&S Examines the distinctive policies, institutions, and social norms of contemporary Scandinavian societies. Topics include: Nordic geography, the development of a "middle way" between capitalism and socialism, universal social policies, Scandinavia in the international system, and contemporary challenges to Scandinavian societies. Recommended: 100.

SCAND 230 Introduction to Folklore Studies (5) VLPA/I&S Comprehensive overview of the field of folkloristics, focusing on verbal genres, customs, belief, and material culture. Particular attention to the issues of community, identity, and ethnicity. Offered: jointly with C LIT 230.

SCAND 232 Hans Christian Andersen and the Fairy Tale Tradition (5) VLPA Influence of Hans Christian Andersen and the fairy tale on modern Scandinavian tales and stories. Investigates the significance of the fairy tale in modern world, with attentions to writers such as Isak Dinesen, Knut Hamsun, Villy Sørensen, William Heinesen.

SCAND 251 Holberg and His Comedies in English (2) VLPA Holberg and his major dramas, with attention to the comic tradition in the Scandinavian theatre.

SCAND 270 Sagas of the Vikings (5) VLPA Icelandic sagas and poetry about Vikings in the context of thirteenth-century society.

SCAND 280 Ibsen and His Major Plays in English (5) VLPA Reading and discussion of Ibsen's major plays.

SCAND 281 August Strindberg and His Major Works (5) VLPA Strindberg as dramatist, novelist, short-story writer, painter. Strindberg's influence on Expressionist drama, cinema, American drama.

SCAND 312 Masterpieces of Scandinavian Literature (5) VLPA Major works of Scandinavian literature by selected authors.

SCAND 325 Public Policy in Scandinavia (5) I&S Comparative and historical analysis of the evolution and change of domestic public policies in the Nordic welfare states; emphasis on health, education, social welfare, economic management, as well as the future of the welfare state. Prerequisite: 200 or equivalent.

SCAND 326 Scandinavia in World Affairs (5) I&S Introduction to the foreign relations of Scandinavia with a focus on Nordic security, international economic pressures, and global conflict resolution. Includes a survey of the national settings for international involvements and highlights the dilemmas for industrial societies exposed to the pressures of interdependence. Offered: jointly with POL S 326.

SCAND 330 Scandinavian Mythology (5) VLPA Integrative study of religious life in the pre-Christian North. Emphasis on source materials, including the Prose Edda and Poetic Edda. Discussion of historical, archaeological, and folkloric evidence.

SCAND 331 Folk Narrative (5) VLPA Survey of various genres of folk narratives studied in performance contexts to reveal their socio-cultural functions in a variety of milieux. Theory and history of folk narrative study, taxonomy, genre classification, and interpretative approaches. Recommended: 230/C LIT 230 or equivalent. Offered: jointly with C LIT 331.

SCAND 332 Folk Belief and World View (5) VLPA Study of folk belief and world view expressed in memorates, legends, magic formulas, and other examples of oral tradition. Analysis of forms and origins of belief genres, their esthetic and social functions, and the role of oral tradition as a tool of social control and change. Offered: jointly with C LIT 332.

SCAND 333 Folklife and Material Culture (5) VLPA Material culture in traditional and contemporary Scandinavia. Comprehensive examination of nonverbal genres (including vernacular architecture, settlement, textile foodways) with an emphasis on broad theoretical issues such as community, identity, ethnicity. Recommended: 230/C LIT 230 or equivalent. Offered: jointly with C LIT 333.

SCAND 335 Scandinavian Children's Literature (3) VLPA Scandinavian children's literature from the authored fairytale to the stories of such writers as Hans Christian Andersen, Elsa Beskow, Astrid Lindgren, Maria Gripe, and Tove Jansson.

SCAND 340 Finno-Ugric Epic and Nationalism (5) VLPA An interdisciplinary approach to the Finnish national epic Kalevala, Estonian Kalevipoeg, and Saami Peivebarnen suongah jehtanasan maajien. Discussion of traditional worldview, cultural revitalization, and emergent nationalism in nineteenth- and twentieth-century Finland, Estonia, and Saamiland.

SCAND 345 Baltic Cultures (5) VLPA/I&S Cultures and peoples of Estonia, Latvia, and Lithuania. Baltic literature, music, art, and film in social and historical context. Traditional contacts with Scandinavia and Central and East Europe. Offered: jointly with SISRE 345.

SCAND 360 Scandinavian Cinema (3/5) VLPA Major Scandinavian films and film directors from the 1920s to the present.

SCAND 365 Kierkegaard and the Existentialist Tradition (3) VLPA Kierkegaard's works. Impact of existentialism on Scandinavian literature, with attention to such authors as Ibsen, Kielland, Lagerkvist, E. Johnson, Dinesen, M. A. Hansen, and Ingmar Bergman.

SCAND 370 The Vikings (5) VLPA/I&S Vikings at home in Scandinavia and abroad, with particular emphasis on their activities as revealed in archaeological finds and in historical and literary sources. Offered: jointly with HSTEU 370.

SCAND 380 History of Scandinavia to 1720 (5) I&S Scandinavian history from the Viking Age to 1720, with an emphasis on the political, social, and economic development of Denmark, Norway, Sweden, Finland, and Iceland from the Middle Ages to the Enlightenment. Offered: jointly with HSTEU 380.

SCAND 381 History of Scandinavia since 1720 (5) I&S Scandinavian history from the Enlightenment to the Welfare State with emphasis on the political, social, and economic development of the modern Scandinavian nations of Denmark, Norway, Sweden, Finland, and Iceland. Offered: jointly with HSTEU 381.

SCAND 383 Scandinavian Immigration in History and Literature (3) VLPA History and literature of Scandinavian emigration to North America, including immigrant life and culture, community structures and traditions, and the literature about, and by, Scandinavian emigrants.

SCAND 427 Scandinavian Women Writers in English Translation (5) VLPA Selected works by major Scandinavian women writers from mid-nineteenth-century bourgeois realism to the present with focus on feminist issues in literary criticism. Offered: jointly with WOMEN 429.

SCAND 430 Readings in Folklore (5) VLPA Exploration of theoretical and methodological issues in folklore studies through independent reading of journal articles published during the last five years. Prerequisite: C LIT/SCAND 230 or equivalent. Offered: jointly with C LIT 430.

SCAND 437 Politics in Scandinavia (5) I&S Twentieth-century politics in Scandinavia. How Scandinavian countries have been governed. Costs and consequences of their governmental style and its uncertain future. Optimal size of polities, problems of mature welfare states, process of leadership and representation in multiparty systems, decline of political parties. Offered: jointly with POL S 437.

SCAND 450 Scandinavian Literary History (3) VLPA Survey of Scandinavian literary history. Prerequisite: two years of a Scandinavian language or permission of instructor.

SCAND 460 History of the Scandinavian Languages (5) VLPA Development of languages from common Scandinavian to contemporary Danish, Norwegian, Swedish, Faroese, and Icelandic. Prerequisite: two years of a Scandinavian language or permission of instructor.

SCAND 462 Isak Dinesen and Karen Blixen (5) VLPA The fiction of Isak Dinesen (pseudonym for Karen Blixen) reevaluated in light of current issues in literary criticism, particularly feminist criticism. Close readings of selected tales, essays, and criticism. Offered: jointly with WOMEN 462.

SCAND 470 Senior Seminar in Folklore (5) VLPA Investigates ethnic and several American folk traditions in the Pacific Northwest through extensive fieldwork. Prerequisite: C LIT/SCAND 230 or equivalent. Offered: jointly with C LIT 470.

SCAND 484 The Films of Ingmar Bergman (5) VLPA Major films of Ingmar Bergman.

SCAND 490 Special Topics (1-5, max. 15) Special topics in Scandinavian art, literature, culture, and history. Course offerings based on instructor's specialty and student demand.

SCAND 498 Senior Essay (5) VLPA Undergraduate research and the writing of a senior essay in Scandinavian area studies. Prerequisite: permission of instructor.

SCAND 499 Independent Study or Research (1-5, max. 10) Independent study or research in Scandinavian area studies. May be done in a Scandinavian language or in English. Prerequisite: permission of instructor.

Courses for Graduates Only

SCAND 500 Introductory Readings in Old Icelandic (5) Systematic study of the grammatical structure of Old Icelandic and the reading of several short prose works.

SCAND 501 Old Icelandic Language and Literature (5) Reading of a major work in Old Icelandic literature as a vehicle for discussions about literary history and genre, narrative and rhetorical strategies.

SCAND 503 Methods of Scandinavian Studies (5) Introduction to Scandinavian studies on the graduate level with emphasis on Scandinavian literature, folklore, history, and politics.

SCAND 504 Contemporary Literary Theory (5) Contemporary literary theory and its application to Scandinavian texts. Prerequisite: graduate student standing or permission of instructor.

SCAND 505 Scandinavian Drama (5) Selective reading in Scandinavian drama.

SCAND 508 Scandinavian Novel (5) Seminar on the Scandinavian novel of the nineteenth and twentieth centuries.

SCAND 513 Scandinavian Linguistics (3) Selected topics in Scandinavian linguistics.

SCAND 515 Pre-Nineteenth-Century Scandinavian Literature (5) Seminar on Scandinavian literature of the sixteenth, seventeenth, and eighteenth centuries.

SCAND 518 Foreign Language Teaching Methodology (2) Current foreign language teaching methods and approaches. Learning and teaching strategies and techniques for the four skills (reading, writing, speaking, listening) including cultural notions. Current and future trends in pedagogy and technology. Offered: jointly with ASIAN 518/GERMAN 518/NEAR E 518/SCAND 518/SLAV 518.

SCAND 519 Modern Scandinavian Politics (5) Analyzes the political, economic, and historical development of Sweden, Norway, Denmark, Iceland, and Finland from World War II to the present. Readings focus on domestic and foreign policies that distinguish these countries from other advanced industrial societies. Offered: jointly with POL S 519.

SCAND 520 Scandinavian Poetry (5) Seminar on Scandinavian poetry from 1890 to the present.

SCAND 522 Scandinavian Romanticism (3) Backgrounds: German idealism; organicist concept of history and esthetics; the poet as visionary genius; revolutionary tendencies and political conservatism; folklore and mythology. Genres: lyrical poetry, national epic, the beginnings of the novel and drama.

SCAND 525 Topics in Scandinavian History (5) Seminar on selected topics in Scandinavian history.

SCAND 527 Scandinavian Short Prose (3) Seminar on the Scandinavian short story and other forms of

short prose.

SCAND 530 Old Norse Literature (3) Studies in the poetry and prose tradition of medieval Iceland and Norway.

SCAND 531 Scandinavian Ballads (3) Seminar on Scandinavian balladry from Middle Ages to present; origin of the ballad, its various genres in Scandinavia, and its oral and written transmission in folk tradition.

SCAND 533 Interdisciplinary Approaches to Community in Scandinavia (5) Humanistic examination of community creation, maintenance, and change in the Nordic region. Examples drawn from folklore, literature, activism, popular culture, history. Focus on issues of gender, belief, and art in relation to community. Coursework includes both individual and collaborative assignments.

SCAND 590 Special Topics in Scandinavian Literature (1-5, max. 15)

SCAND 595 Teaching Assistant Workshop (1) Focuses on topics in language pedagogy. Required for teaching assistants in Scandinavian languages. Required for all teaching assistants. Credit/no credit only.

SCAND 600 Independent Study or Research (*) Prerequisite: permission of instructor.

SCAND 700 Master's Thesis (*)

SCAND 800 Doctoral Dissertation (*)

Slavic Languages and Literatures

M253 Smith

The Department of Slavic Languages and Literatures offers instruction in the principal East European languages and literatures and in Slavic linguistics, working closely with the School of International Studies. Languages include Bulgarian, Czech, Polish, Romanian, Russian, Croatian/Serbian, and Ukrainian.

Undergraduate Program

Adviser

David Miles
M253 Smith
email: slavlicl@u.washington.edu

The Department of Slavic Languages and Literatures offers undergraduate courses in Russian and other Slavic and East European languages and literatures. The courses are designed both for majors planning careers in teaching, translation, government service, communications, and international business, and for all students wishing to acquire a knowledge of East European regions of the world and their languages and cultures.

The department sponsors the Russian House, where students are provided an opportunity to enhance their knowledge of Russian in a Russian-speaking environment.

Bachelor of Arts

Major Requirements

Russian Language and Literature Concentration: RUSS 301, 302, 303, or the equivalent; RUSS 401, 402, 403, or the equivalent; RUSS 321, 322, 323; 15 credits from the following: RUSS 324, 351, 352, 421, 422, 423, 426, 427, 428, 429, 451, 452, 461, 463, 490, or SLAV 351.

Russian Language and History Concentration: RUSS 301, 302, 303, or the equivalent; RUSS 401, 402, 403, or the equivalent; RUSS 321, 322, 323; HSTAM 443, HSTEU 444, 445.

East European Languages Concentration: Two years of a principal East European language, or the equivalent; one year of an additional East European language or RUSS 201, 202, 203, or the equivalent; 10 credits of course work (which may include RUSS 321, 322, 323) in the appropriate literatures of the cultures involved; SLAV 351.

Minors

Minor Requirements

Russian Language: 25 credits to include RUSS 301, 302, 303 and 10 credits from RUSS 351, 352, 401, 402, 403, 451, 452, SLAV 351.

Russian Literature/Slavic Literatures: 25 credits to include RUSS 321, 322, 323 and 10 credits from RUSS 421, 422, 423, 426, 427, 428, 429, 461, 463 (Russian literature option), or 10 credits from CR SB 420, CZECH 420, POLSH 420 (Slavic literatures option).

Slavic Languages: 25 credits to include language courses in a Slavic language other than Russian numbered 404, 405, 406; SLAV 351; and 5 credits from CR SB 420, CZECH 420, POLSH 420.

Graduate Program

The Department of Slavic Languages and Literatures offers a complete program of courses and seminars leading to the Master of Arts and Doctor of Philosophy degrees in Russian and East European literatures or Slavic linguistics with a strong component of advanced language study. Languages taught in the department include Bulgarian, Czech, Old Church Slavonic, Polish, Romanian, Russian, Croatian/Serbian, and Ukrainian.

The graduate program is organized to permit completion of the master's degree in four to six quarters and the doctoral degree in three additional years. The duration of each program, however, will depend on the extent of the student's preparation upon entrance into the program.

Research Facilities

The Suzzallo Library holdings include some 200,000 titles in the languages of Eastern Europe. While the majority of these titles are in Russian, the collection is well provided with resources in Bulgarian, Czech, Hungarian, Polish, Romanian, and Croatian/Serbian languages and literatures.

Admission Qualifications

For the Master of Arts program: Bachelor of Arts degree with major in Russian or Eastern European languages and literatures or equivalent background.

For the Doctor of Philosophy program: Master of Arts degree with major in a Slavic literature or linguistics.

Assistantship Opportunities

The department regularly offers a number of teaching assistantships. In conjunction with the Henry M. Jackson School of International Studies, students in the department are eligible for several other types of fellowships.

Correspondence and Information

Graduate Program Coordinator
M253 Smith, Box 353580

Faculty

Chair

Karl D. Kramer

Professors

Augerot, James E. * 1960; MA, 1959, New Mexico Highlands University; PhD, 1968, University of Washington; Slavic linguistics, Romanian, Bulgarian.

Haney, Jack V. * 1965; DPhil, 1971, Oxford University (UK); medieval Russian literature, Slavic folklore.

Kapetanac, Davor * 1972, (Emeritus); PhD, 1972, University of Zagreb (Yugoslavia); Yugoslav literature, Slavic literary theory.

Micklesen, Lew R. * 1966, (Emeritus); PhD, 1951, Harvard University; Slavic linguistics.

Associate Professors

Coats, Herbert S. * 1968; PhD, 1970, University of Illinois; Slavic linguistics, Russian phonology, Russian syntax, Slavic accentuation.

Diment, Galya * 1989; PhD, 1987, University of California (Berkeley); twentieth-century Russian literature, comparative literature, modernism, cultural studies.

Konick, Willis * 1950; PhD, 1964, University of Washington; Russian literature, nineteenth-century European literature.

Kramer, Karl D. * 1970; PhD, 1964, University of Washington; Russian literature.

West, James D. * 1972; PhD, 1970, Cambridge University (UK); modern Russian literature, art and philosophy.

Assistant Professors

Crnkovic, Gordana * 1993; PhD, 1993, Stanford University; East European literature, film and cultural studies, former Yugoslavia, theory, American literature.

Dziwirek, Katarzyna A. * 1993; PhD, 1991, University of California (San Diego); linguistics, syntax and typology.

Senior Lecturers

Gross, Vladimir 1959, (Emeritus); MA, 1965, University of Washington; Russian language, poet singers.

Holdsworth, Nora 1963, (Emeritus); BA, 1965, University of Washington; Russian language.

Polack, Zoya M. 1973; MA, 1975, University of Washington; Russian and Ukrainian languages.

Lecturer

Boyle, Eloise M. 1995; PhD, 1988, Ohio State University; twentieth-century Russian literature, pedagogy, teaching methodology.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

Language Courses

Bulgarian

BULGR 401, 402, 403 Elementary Bulgarian (5, 5, 5) 401, 402: Introduction to Bulgarian phonology and grammar in terms of the modern spoken language. Writing conventions of literary Bulgarian. 403: reading of modern texts to increase command of grammar and vocabulary. Offered: A, W, Sp.

BULGR 404, 405, 406 Advanced Bulgarian (5, 5, 5) **VLPA** Continuation of 401, 402, 403. Selected readings in Bulgarian literature, history, and culture. Reinforces and extends basic knowledge of Bulgarian grammar and vocabulary. Prerequisites: 403 for 404; 404 for 405; 405 for 406; or permission of instructor. Offered: A, W, Sp.

Croatian/Serbian

CR SB 401, 402, 403 Elementary Croatian/Serbian (5, 5, 5) Comprehensive introduction to spoken and written literary Croatian and Serbian. Prerequisites: 401 for 402; 402 for 403 or permission of instructor. Offered: A, W, Sp.

CR SB 404, 405, 406 Advanced Croatian/Serbian (5, 5, 5) **VLPA** Continuation of 401, 402, 403; reinforces basic grasp of language and enlarges both vocabulary and command of grammatical patterns through the reading of contemporary short stories both Croatian and Serbian. Prerequisites: 403 for 404; 404 for 405; 405 for 406 or permission of instructor. Offered: A, W, Sp.

Czech

CZECH 401, 402, 403 Elementary Czech (5, 5, 5) 401, 402: introduction to spoken and written Czech. 403: modern Czech prose, leading to a command of the language as a research tool and providing an adequate basis for further study. Offered: A, W, Sp.

CZECH 404, 405, 406 Advanced Czech (5, 5, 5) **VLPA** Continuation of 401, 402, 403. Selected readings from the main works of Czech authors of the nineteenth and twentieth centuries. Reinforces and extends basic knowledge of Czech grammar and vocabulary. Prerequisites: 403 for 404; 404 for 405; 405 for 406; or permission of instructor. Offered: A, W, Sp.

Polish

POLSH 401, 402, 403 Elementary Polish (5, 5, 5) 401, 402: Principal morphological and syntactic features of the Polish language through the medium of a basic vocabulary. 403: designed to enlarge general vocabulary by the reading of short texts selected from Polish authors of the nineteenth and twentieth centuries. Offered: A, W, Sp.

POLSH 404, 405, 406 Advanced Polish (5, 5, 5) **VLPA** Continuation of 401, 402, 403. Selected readings of the main works from nineteenth and twentieth centuries. Reinforces basic knowledge of vocabulary, grammatical patterns, and conversation. Prerequisites: 403 for 404; 404 for 405; 405 for 406; or permission of instructor. Offered: A, W, Sp.

Romanian

ROMN 401, 402, 403 Elementary Romanian (5, 5, 5) 401, 402: comprehensive introduction to spoken and literary Romanian. 403: designed to increase vocabulary and enhance knowledge of grammar through readings in modern Romanian. Offered: jointly with RMN 401, 402, 403. A, W, Sp.

ROMN 404, 405, 406 Advanced Romanian (5, 5, 5) **VLPA** Continuation of 401, 402, 403. Introduction to Romanian literature, history, and culture through selected readings. Reinforces and extends basic knowledge of grammar and vocabulary. Prerequisites: 403 for 404; 404 for 405; 405 for 406; or permission of instructor. Offered: jointly with RMN 404, 405, 406. A, W, Sp.

Russian

Undergraduate Russian language sequences: (A) RUSS 101 (5), 102 (5), 103 (5), 201 (5), 202 (5), 203 (5), 301 (5), 302 (5), 303 (5), 401 (5), 402 (5), 403 (5); (B) RUSS 150 (15), 250 (15), 350 (15), 450 (15).

Credit: Credit is not allowed for overlapping courses in two sequences (e.g., a student may receive a maximum of 15 credits for 101, 102, 103, and 150). Credit is allowed for courses in different sequences, though, if

the courses are taken in progressively more advanced order (e.g., 150 followed by 201).

Placement Policy: While students may enroll for whatever language level seems appropriate, final placement in a language course is determined by their score on a diagnostic test administered at the beginning of the quarter. The Russian program reserves the right to place students in a higher or lower course, according to the test results.

RUSS 101, 102, 103 First-Year Russian (5, 5, 5) Introduction to Russian. Emphasis on oral communication with limited vocabulary. Short readings and writing exercises. Basic grammar. Conducted mostly in Russian. See credit note above. Offered: A, W, Sp.

RUSS 150 Intensive First-Year Russian (15) Covers material of 101, 102, 103 in one quarter. Meets three to four hours daily. For continuation, see 250 or 201, 202, 203. See credit note above. Offered: S.

RUSS 201, 202, 203 Second-Year Russian (5, 5, 5) **VLPA** Comprehensive review of Russian grammar with continuing oral practice and elementary composition. Conducted mostly in Russian. Prerequisites: 150, 103, or permission of instructor for 201; 201 or permission of instructor for 202; 202 or permission of instructor for 203. See credit note above. Offered: A, W, Sp.

RUSS 250 Intensive Second-Year Russian (15) **VLPA** Covers material of 201, 202, 203 in one quarter. Meets three hours daily. Prerequisite: 150, 103, or permission of instructor. See credit note above. Offered: S.

RUSS 301, 302, 303 Intermediate Russian (5, 5, 5) **VLPA** Extensive practice in spoken and written Russian based on a variety of prose readings. Intensive review and supplementation of strategic grammatical concepts. Prerequisites: 203, 250, or permission of instructor. See credit note above. Offered: A, W, Sp.

RUSS 304 Reading and Translation (1, max. 3) **VLPA** Translation techniques with emphasis on development of vocabulary and reading skills. Primarily for Russian regional studies majors. Credit/no credit only. Prerequisite: 203 or permission of instructor. Offered: AWSp.

RUSS 313 Business Russian (5) VLPA Emphasizes the language and practice of business in Russia today. Prerequisite: 203, 250, or equivalent.

RUSS 350 Intensive Third-Year Russian (15) **VLPA** Covers material of 301, 302, 303 in one quarter. Meets three hours daily. Prerequisites: 203, 250, or permission of instructor. See credit note above. Offered: S.

RUSS 351 Intermediate Russian Phonetics (3) **VLPA** Systematic study of the Russian sound system, including phonetic transcription and intonational patterns. Instruction in correcting individual pronunciation errors. Conducted partly in Russian. Prerequisite: 203 or 250. Offered: A.

RUSS 352 Intermediate Russian Morphology (3) **VLPA** Examination of Russian morphology with emphasis on topics that help to prepare the student for advanced courses in Russian. Conducted partly in Russian. Prerequisite: 203 or 250. Offered: W.

RUSS 381 Phonetics in St. Petersburg (2, max. 6) **VLPA** Systematic analysis of the Russian sound system as well as intonational patterns. Practical reading exercises. Special attention to correcting individual pronunciation errors. (2 credits for Summer Quarter program, 5 credits for semester program.) Prerequisite: 203 for Summer Quarter, 303 for semester. Offered: AWSpS.

RUSS 382 Advanced Syntax and Composition in St. Petersburg (2, max. 6) VLPA Class lectures on Russian syntactic structures. Oral drilling and written exercises and compositions. (2 credits are offered for

the six-week Summer Quarter program, 5 credits for the fourteen-week semester program.) Prerequisite: 203 for Summer Quarter, 303 for semester. Offered: AWSpS.

RUSS 383 Conversation in St. Petersburg (4, max. 12) VLPA Designed to increase active vocabulary, to further the student's control of idiomatic Russian, and to develop oral skills. (4 credits are offered for the six-week Summer Quarter program, 8 credits for the fourteen-week semester program.) Prerequisite: 203 for Summer Quarter, 303 for semester. Offered: AWSpS.

RUSS 384 Culture in St. Petersburg (4, max. 12) VLPA/ISS Lectures on education, history, economics, law, the arts, ethnography, architecture; complemented by visits to places of cultural and historical interest and meetings with Russian groups. 4 credits for summer program, 6 for semester program. Prerequisite: 203 for Summer Quarter, 303 for semester. Offered: AWSpS.

RUSS 401, 402, 403 Advanced Russian (5, 5, 5) **VLPA** Class discussion, oral presentations, and composition, based on reading a variety of texts, both literary and non-literary. Advanced grammar. Translation one full course period per week. See credit note above. Prerequisites: 303 for 401; 401 for 402; 402 for 403; or permission of instructor. Offered: AWSp.

RUSS 404 Russian Literary Translation (5) VLPA Intensive practical work in the translation of Russian literary texts. Specific problems associated with the translation of particular kinds of texts. Prerequisite: 303 or 350.

RUSS 450 Intensive Fourth-Year Russian (15) **VLPA** Covers material of 401, 402, 403 in one quarter. Meets three hours daily. Prerequisite: 303, 350, or permission of instructor. See credit note above. Offered: S.

RUSS 451, 452 Structure of Russian (5, 5) VLPA Descriptive analysis of contemporary standard Russian. Detailed phonetic transcription, discussion of major Great Russian dialects as well as variations in popular speech, examination of common roots and productive derivational elements in Russian words, and elementary principles of syntax. Prerequisites: 303 or equivalent for 451; 451 for 452; or permission of instructor. Offered: A, W.

RUSS 461, 463 Introduction to Russian Literature in Russian (5, 5) VLPA Analysis of original Russian literary texts representative of different varieties of Russian writing. Vocabulary of Russian literary analysis; typically Russian approaches to literature, some readings of secondary critical texts; discussion in Russian of passages studied. Prerequisite: 403 or 450 or current enrollment in fourth-year Russian and permission of instructor.

RUSS 481 Russian Language in St. Petersburg (15) VLPA Daily work in phonetics, grammar, conversation, translation, analytical reading, stylistics, newspaper analysis, and advanced syntax. Prerequisite: 403 or 450; prior experience in a study abroad program preferred.

RUSS 482 Research Project in St. Petersburg (12) VLPA Supervised research in student's selected area of concentration, combined with language instruction tailored to the student's field. Successful completion of course requires a 15-page term paper in Russian. Prerequisite: 403 or 450; prior experience in a study abroad program preferred.

RUSS 483 Russian Literature in St. Petersburg (5, max. 10) VLPA Selection of courses on specialized topics in Russian literature; specific authors or periods. Prerequisite: 403 or 450; prior experience in a study abroad program preferred.

RUSS 484 Russian History in St. Petersburg (5, max. 10) VLPA/ISS Selection of courses on specialized topics in Russian political, economic, social, cul-

tural, or art history. Prerequisite: 403 or 450; prior experience in a study abroad program preferred.

RUSS 485 Economics in St. Petersburg (5, max. 10) VLPA/ISS Selection of courses on topics relating to economic issues. Prerequisite: 403 or 450; prior experience in a study abroad program preferred.

RUSS 499 Directed Study or Research (1-5, max. 15) Individual study of topics to meet specific needs. By arrangement with the instructor and the Department of Slavic Languages and Literature office. Prerequisite: permission of instructor and undergraduate adviser. Offered: AWSpS.

Slavic

SLAV 351 History of the Slavic Languages (5) VLPA External and internal history of Slavic literary languages from the beginnings to the present time, including the development of writing systems, external attempts at reform, and the development of vocabulary. Offered: Sp.

SLAV 498 Senior Honors Thesis ([3-9]) **VLPA** Directed research on a topic approved by department for a thesis presented in partial fulfillment of requirement for degrees "with honors" or "with distinction". Credit/no credit only. Offered: AWSpS.

SLAV 499 Directed Study or Research (1-5, max. 15) Individual study of topics to meet specific needs. By arrangement with the instructor and the Department of Slavic Languages and Literature office. Prerequisite: permission of instructor and undergraduate adviser. Offered: AWSpS.

Ukrainian

UKR 401, 402, 403 Elementary Ukrainian (5, 5, 5) Introduction to spoken and written Ukrainian.

Literature Courses in English

Courses in this section usually do not require prerequisites. The 300-level courses generally deal with particular themes running through a body of literature or involve a comprehensive study of cultural history. The 400-level courses deal with Slavic literatures other than Russian or specific authors and periods in Russian literature. Both levels are primarily for juniors and seniors, but are open to freshmen and sophomores with an interest or background in the subject of the course.

Croatian/Serbian

CR SB 420 Drawn from the Fire: Literature of the Former Yugoslavia in English (5) VLPA Twentieth-century prose of the former Yugoslavia. Cultural identity at the crossroads between East and West. Relation of Yugoslav literature, created on the European margin, to the European cultural centers. Literature and the myths of socialism and nationalism. Yugoslav oral tradition. Issues of gender.

Czech

CZECH 420 Modern Czech Literature in English (5) VLPA Representative works of Czech literature from the 1920s to the present in the context of earlier Czech and general European literary trends. Emphasis on prose and drama of major writers, including Hasek, Capek, Vancura, Skvorecky, Kundera, Vaculik, and Havel.

Polish

POLSH 420 Modern Polish Literature in English (5) VLPA Representative prose works by leading twentieth-century Polish writers. Polish literature's critique of modern European civilization. The relation of historical memory, collective victimization, and the utopian imagination in Polish literature to political power and national survival.

Russian

RUSS 321 Russian Literature and Culture to 1700 (5) VLPA/MS Literature as an element in Russian culture. Art, architecture, music, philosophy, and folklore also treated. Periods covered include medieval, Renaissance, Reformation, and baroque. Offered: A.

RUSS 322 Russian Literature and Culture 1700-1900 (5) VLPA/MS Literature as an element in Russian culture. Art, architecture, music, and philosophy also treated. Periods covered include the age of Peter the Great, romanticism, realism, and impressionism. Offered: W.

RUSS 323 Russian Literature and Culture of the Twentieth Century (5) VLPA/MS Literature as an element in modern Russian culture. Art, architecture, and music also treated. Periods covered include symbolism, revolution, postrevolution, Stalinist, the "thaw," and contemporary. Offered: Sp.

RUSS 324 Russian Folk Literature in English (5) VLPA/MS Russian popular tradition, including paganism and its survival into modern times. Genres of the oral tradition, including the folktale, the epic, spiritual and historical songs, and legends. Special attention to modern theories and western European analogues. Offered: W.

RUSS 421 Russian Literature of the Soviet Period in English (5) VLPA Major Russian authors of the twentieth century.

RUSS 422 Russian Literature in Emigration and Exile (5) VLPA Examines writers who left the Soviet Union during the post-Stalin period up to the fall of communism or who, though they resided in the USSR, published through unofficial channels. Discussion of Aksyonov, Sinlasky, Voinovich, Zinoviev, and others.

RUSS 423 Russian Film and Fiction (5) VLPA Thematic and structural interrelationships of narrative in film and fiction in post-revolutionary Russia.

RUSS 426 Pushkin, Gogol, Turgenev in English (5) VLPA Selections include Eugene Onegin and The Queen of Spades by Pushkin, Dead Souls by Gogol, Fathers and Sons by Turgenev, and works of one or two of their contemporaries.

RUSS 427 Tolstoy in English (5) VLPA Major works of Leo Tolstoy.

RUSS 428 Dostoevsky in English (5) VLPA Introduction to the major fiction of Dostoevsky.

RUSS 429 Chekhov in English (5) VLPA Short stories and plays, as well as works of one or two of Chekhov's contemporaries.

RUSS 490 Studies in Russian Literature (3-5, max. 15) VLPA In either Russian or English. Topics vary.

Slavic

SLAV 490 Studies in Slavic Literatures (3-5, max. 15) VLPA Topics vary.

Courses for Graduates Only

Russian

RUSS 501 Russian Language for Graduate Students (2, max. 10) Develops skills of particular use to graduate students. Emphasis on rapid assimilation of variety of written materials with sophisticated understanding and maximum retention of vocabulary, and ability to discuss in Russian the more theoretical and abstract kinds of material. Prerequisites: 403 or equivalent and graduate standing in Russian, East European, and Central Asian Studies.

RUSS 502 Russian Translation (3) Introduction to the theory of translation; translation to and from Russian of selected prose passages in a variety of styles, with emphasis on idiomatic accuracy and stylistic compatibility. Prerequisite: two quarters of 501 or permission of instructor.

RUSS 512 Russian Literary Criticism (3) A study of critical positions, problems, and literary values of major Russian literary critics from Belinsky to the present.

RUSS 520 Seminar in Russian Poetry (5) Topics in Russian poetry and poetry criticism to be selected by the instructor and students. Some emphasis on recent theoretical approaches to poetry criticism that are current in Russia and eastern Europe. For advanced MA and Ph.D. students. Offered: alternate years.

RUSS 522 Russian Literature, 1800-1840 (5) Russian poetry and prose in the period 1800-1840. Readings cover prose from Karamzin to early Gogol, poetry from Zhukovsky to Lermontov with special emphasis on Pushkin. Offered: alternate years.

RUSS 524 Russian Literature, 1840-90 (5) Russian poetry and prose in the period 1840 to 1890. Short prose works and excerpts from longer works, by Gogol, Turgenev, Leskov, Saltykov-Shchedrin, Pisemsky, Uspensky, Goncharov, and Dostoevsky; poetry by Tyutchev, Fet, and Nekrasov; plays by Gogol and Ostrovsky; and excerpted contemporary critical writings. Offered: alternate years.

RUSS 525 Russian Literature, 1890-1917 (5) Survey of major trends in Russian literature around the turn of the twentieth century, based on texts and critical readings in Russian. Includes both the prose and the poetry of realists of the late nineteenth century, symbolists, acmeists, and futurists. Offered: alternate years.

RUSS 527 Seminar in Nineteenth-Century Russian Poetry (5) Selected topics in nineteenth-century Russian poetry to be investigated in depth and with some critical sophistication. For Ph.D. and advanced MA students. Offered: alternate years.

RUSS 528 Seminar in Nineteenth-Century Russian Prose (5) Topic course devoted to one specific problem or theme in nineteenth-century Russian prose literature, seen in its widest possible dimensions. Students must read, in Russian, the literary works involved and become familiar with the social, historical, and philosophical backgrounds that inspired them.

RUSS 529 Seminar in Early Twentieth-Century Russian Literature (5) One specific problem or theme in twentieth-century Russian poetry and prose, seen in the widest possible dimensions. Students must read, in Russian, the literary works involved and become familiar with the social, historical, and philosophical backgrounds that inspire them. Offered: alternate years.

RUSS 532 Pushkin (5) Reading, in Russian, of the major works of Alexander Pushkin and important critical works on him, and discussion of them in depth. Strongly recommended: 522. Offered: alternate years.

RUSS 533 Chekhov (5) Detailed analysis of the plays and short stories of Anton Chekhov in Russian. Offered: alternate years.

RUSS 534 Dostoevsky (5) Analysis of the works of Fyodor Dostoevsky in Russian.

RUSS 535 Tolstoy (5) Close analysis of one or two works by L. Tolstoy in Russian.

RUSS 541 Russian Literature, 1917 to Present (5) Study of Russian poetry and prose since 1917. From Blok and Plinyak to contemporary authors. Offered: alternate years.

RUSS 542 Seminar in Contemporary Russian Poetry (5) One specific problem or theme in contemporary Russian poetry, seen in its widest possible dimensions. Students must read, in Russian, the literary works involved and become familiar with the social, historical, and philosophical backgrounds that inspire them. Offered: alternate years.

RUSS 543 Seminar in Contemporary Russian Prose (5) Analysis of Russian prose fiction of the post-1917 period. Selected authors and topics. Offered: alternate years.

RUSS 551 Advanced Russian Morphophonology (3) Study of Russian phonological and morphological data, with detailed discussion and evaluation of methods of incorporating these data in scientific grammars. Prerequisite: 452. Offered: alternate years.

RUSS 552 Advanced Russian Syntax (3) Presentation and structural analysis of various simple and complex sentence types in the Russian literary language and an evaluation of ways in which these structures may be described in formal grammars. Prerequisite: 551. Offered: alternate years.

RUSS 554 History of the Russian Literary Language (5) Russian literary language from the eleventh through the twentieth centuries, with special attention to syntax and lexicon and to the development of notions of literary styles. Offered in Russian. Prerequisites: 555 or SLAV 565, or permission of instructor. Offered: alternate years.

RUSS 555 History of the Russian Language (4) Brief review of the development of Russian from Indo-European to late Common Slavic, followed by a detailed account of grammatical and lexical developments of literary Russian from the earliest documents to the present. Prerequisite: SLAV 560 or permission of instructor. Offered: alternate years.

RUSS 556 Readings in the History of the Russian Language (4) Reading, translation, and detailed grammatical analysis of selected texts from various literary genres and periods in the development of the Russian literary language. Prerequisite: 555. Offered: alternate years.

RUSS 565 Russian Eighteenth-Century Literature (5) Discussion of representative works of poetry, prose, fiction, and criticism in the eighteenth century. Offered: alternate years.

RUSS 570 Research Seminar in Russian Literature (5) Diment, Haney, Kramer, West Working in consultation with a faculty adviser, students formulate a topic and prepare a 30-minute oral presentation to be delivered at the seminar and submit a written paper to be read and critiqued, by all participants.

RUSS 574 Russian Literature to 1800 (5) Representative works of East Slavic, Muscovite, and Russian literature from the beginnings to 1800. Studies include a varied selection of primary texts. Intended as an introduction to the study of modern literature for beginning graduate students in Russian literature. Offered: alternate years.

RUSS 575 Kievan Literature (5) Analysis of representative works of prose and poetry of Kievan Rus' from the beginnings to the end of the fourteenth century.

RUSS 576 Muscovite Literature (5) Analysis of representative works of prose and poetry of the Muscovite period from the end of the fourteenth century to the reign of Peter I.

RUSS 577 Russian Folk Literature (5) Analysis of representative works of the various genres of folk literature, including the byliny, skazki, historical and lyrical songs, and the spiritual stikhi.

RUSS 578 Studies in Kievan Literature (4) Field course for students with a specialization in Kievan literature. Work with primary sources, textual tradition, and bibliography.

RUSS 579 Studies in Muscovite Literature (4) Field course for students with a specialization in Muscovite literature. Work with primary sources, textual tradition, and bibliography.

RUSS 588 Introduction to Literary Analysis (2) Russian literature, covering bibliographic materials, major critical problems, terms, schools, and genres.

RUSS 600 Independent Study or Research (*)

Slavic

SLAV 518 Foreign Language Teaching Methodology (2) *Brandl* Current foreign language teaching methods and approaches. Learning and teaching strategies and techniques for the four skills (reading, writing, speaking, listening) including cultural notions. Current and future trends in pedagogy and technology. Offered: jointly with ASIAN 518/GERMAN 518/NEAR E 518/SCAND 518.

SLAV 520 Slavic Literary Theory (3) Main works of the Russian, Czechoslovakian, and Polish theorists of the twentieth century, with special emphasis on formalist, structural, and semiotic schools.

SLAV 560 Historical Survey of Common Slavic (5) Slavic languages and their geographical and dialectical distribution; Slavic civilization throughout prehistoric and early historic periods; principal phonological and morphological features of Slavic as a subgroup of the Indo-European family of languages. Offered: A.

SLAV 561 History of the East Slavic Languages (5) Designed to acquaint majors in Slavic linguistics with the details of the historical development of the phonological and morphological structure of the Ukrainian and Byelorussian literary languages. Prerequisite: 560. Offered: alternate years.

SLAV 562 History of the West Slavic Languages (5) Designed to acquaint majors in Slavic linguistics with the details of the historical development of the phonological and morphological structure of literary Polish, Czech, Slovak, and Upper and Lower Serbian languages. Prerequisite: 560. Offered: alternate years.

SLAV 563 History of the South Slavic Languages (5) Designed to acquaint majors in Slavic linguistics with the details of the historical development of the phonological and morphological structure of the South Slavic languages. Prerequisite: 560.

SLAV 565 Old Church Slavonic (4) Rise and development of earliest Slavic literary language and a descriptive study of its orthography, phonology, morphology, and syntax. Readings from normalized texts. Offered: alternate years.

SLAV 566 Readings in Old Church Slavonic (4) Reading and grammatical interpretation of a selected group of canonical texts, as well as some examples of the various later recensions of Old Church Slavonic. Prerequisite: 555. Offered: alternate years.

SLAV 570 Seminar on Slavic Linguistics (3) Investigation and discussion of special topics in Slavic linguistics.

Society and Justice

101 Gowen

A multi-disciplinary approach to the study of law, social relations, and justice, with particular emphasis on the study of criminal behavior and the criminal justice process in American society. Students select from a wide range of course offerings and are provided with research and field experience opportunities.

Undergraduate Program

Bachelor of Arts

Admission Requirements: POL S/SO JU 363; SOC 271 or 371; SOC 372; one research methods or statistics course from the program requirement list; minimum

2.00 overall GPA. Admission is competitive, based on the following: GPA, with emphasis on grades received in courses required for admission (applicants accepted normally present cumulative GPAs considerably above 2.50); personal statement representing the student's interest in and commitment to becoming a society and justice major; other evidence of a commitment to the study of society, justice, and law. Junior standing preferred. Admission is twice a year during spring and autumn quarters. Students admitted in the spring begin the SO JU major in the autumn; students admitted in the autumn begin the SO JU major in the winter. The application deadline is the second Friday of spring or autumn quarter; admission decisions are made by the end of the fifth week of the quarter.

Major Requirements: 60 credits from the society and justice list of affiliated courses to include (1) the three required core courses (15 credits); (2) at least 15 credits from one of three designated tracks of study: criminal justice; law and politics; society, justice, and law in theoretical and comparative perspective; and at least 5 credits from each of the other two tracks; (3) SO JU 400 and 401; and (4) at least 8 credits of research methodology.

Minor

Minor Requirements: 30 credits to include three courses from SO JU 363, SOC 271, SOC 371, SOC 372 (15 credits); three courses from Society and Justice major tracks (two courses from one track, one course from another track) (15 credits). See Society and Justice adviser for track course options.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

SO JU 310 Research in Society and Justice (1-5, max. 15) I&S Supervised introductory individual and/or seminar based research on some aspect of society and justice. Prerequisite: major standing.

SO JU 363 Law in Society (5) I&S Inquiry into how law matters in social practice. Examines general theories of law, the workings of legal institutions, and the character of legally constituted practices and relationships in diverse terrains of social life. Offered: jointly with POL S 363.

SO JU 380 Contemporary Issues in Criminal Justice (5) I&S Overview of selected contemporary issues in the criminal justice system. Theoretical, empirical, and practical aspects of such topics as the war on drugs, sexual predators, community policing, family and crime, media, and criminal justice. Prerequisites: POL S 101, 202, 204, or SOC 110.

SO JU 400 Seminar in Society and Justice (3, max. 6) I&S Aspects of the administration of justice. Prerequisite: major standing.

SO JU 401 Field Experience in Society and Justice (5) Participant observation in some public or private agency relevant to the system of justice. Prerequisite: major standing.

SO JU 405 Introduction to Organized and White Collar Crime (3) I&S Overview of organized and white collar crime. Exposure to definitional problems, distinctive characteristics, potential areas of overlap, and barriers to more effective social control. Addresses impediments resulting from inadequate conceptualizations, legal and operational difficulties in pursuing offenders, and effects of corruption and discretion in the justice system. Prerequisite: major standing.

SO JU 410 Feminist Legal Studies: Theory and Practice (5) I&S Examines feminist theoretical analyses of the law. Engages in current debate on the study

of critical race, gender, and class theory. Includes: women in prison, public assistance, the sex industry, women and health care, and immigration law. Prerequisites: WOMEN 200, one upper division women studies course, or permission of instructor. Offered: jointly with POL S 466/WOMEN 410.

SO JU 425 Introduction to the American Court System (3) I&S Philosophical and structural bases of the American court system; roles of attorneys, judges and the public in that system. Some focus also on current challenges to the courts posed by court congestion and alternative dispute resolution, and on future prospects for the courts. Prerequisite: major standing.

SO JU 430 The Police (5) I&S Conceptual and empirical issues concerning multifaceted and changing roles of the American police. Prerequisite: major standing.

SO JU 440 Criminal Law and Procedure (4) I&S Substantive and procedural criminal law for lay persons; analysis of the philosophy behind the law, with an emphasis on due process in adult and juvenile courts; case-analysis teaching technique. Prerequisite: major standing.

SO JU 450 Special Topics in Society and Justice (1-5, max. 15) I&S Examination of various current topics or issues concerning the criminal justice system in our society.

SO JU 470 Evaluation Research in Criminal Justice (5) I&S Social science research methods relevant to criminal justice evaluation and operations research. Ethical considerations, formulation of goals and objectives, problem definition and research design, sources and methods of data collection, descriptive statistics, data interpretation, and utilization of research results. Prerequisite: major standing.

SO JU 473 Corrections (5) I&S Analyzes research on diversionary methods, treatment of convicted offenders. Emphasis on program evaluation. Community treatment, fines, restitution, probation, parole, halfway houses, other alternatives to incarceration; correctional institutions. Organization of state, federal systems. Problems of administration. Subsidies, governmental control. Planning, public participation. Prerequisites: SOC 371, 372. Offered: jointly with SOC 473.

SO JU 499 Readings in Society and Justice (1-5, max. 10) Individual readings in society and justice. Prerequisite: major standing.

Sociology

202 Savery

The Department of Sociology has a strong commitment to research, publication, and training and is dedicated to providing a rich undergraduate program, both for students majoring in sociology and for others who wish to learn about human society and social relations.

Undergraduate Program

Director of Instructional Programs
Bruce D. Bennett
210 Savery

Bachelor of Arts

Admission Requirement: No fewer than 10 credits of course work in sociology, to include SOC 110 or equivalent, with a 2.50 GPA for all sociology courses earned at the time of declaring a sociology major. Special circumstances will be reviewed on a case-by-case basis.

Major Requirements: 50 credits in sociology, including: (1) SOC 110 or equivalent; (2) SOC 328-329, to be

fulfilled as soon as possible after declaration of a major in sociology (SOC 328-329 is a prerequisite for all 400-level sociology courses); (3) 35 credits of sociology electives to include at least 15 credits at the 400 level and at least 5 additional credits at the 300 level or above; (4) at least one course in each of three different areas of sociological study and a second course (at the 400 level) in at least one of the areas: the eight designated areas for this requirement are demography and ecology, deviance and social control, family, macrosociology, organizations and industrial sociology, sex and gender, social psychology, stratification and race relations; (5) minimum grade of 1.7 in any course used for the major; cumulative GPA of 2.50 or above in all sociology courses taken at the UW.

Graduate Program

Sociology seeks to explain social structure, social institutions, and social interaction. The department has graduate program specialization in demography and ecology; deviance and social control; race and ethnic relations; family systems; gender studies; macrosociology; organizations and occupations; quantitative research methodology; social psychology; sociological theory; and stratification.

Emphasis is on empirical research aimed at testing theories and generating new principles. Students are trained in problem formulation, research design, data gathering and analysis, and bringing data to bear on significant questions. Instruction is offered in various methods: statistical, survey, computer, demographic and ecological, interaction observation, experimental, case study, field research, and historical. Students learn social research by participating in faculty projects or developing their own studies. Also available is an extensive program in training students to teach.

The graduate program aims at completion of the Master of Arts degree in two calendar years and the Doctor of Philosophy degree in three years beyond the M.A. degree, although not all students finish in this time. A thesis is required for the M.A. degree. For the Ph.D. degree, the student must be certified in general methodology and in a major and a minor substantive area, in addition to completing an approved dissertation.

Special Requirements

Applicants for admission to the Master of Arts program are evaluated on their undergraduate performance, Graduate Record Examination scores, statement of educational plans, recommendations, and samples of their written work. For admission to the Ph.D. program, students are expected to have completed an M.A. degree in sociology in this department or elsewhere. Occasionally, M.A. degrees in other fields are accepted as a basis for admission to the Ph.D. program. The department encourages applications from minority students.

Financial Aid

Fellowships, research assistantships, and teaching assistantships are available to qualified graduate students including those in their first year of training.

Correspondence and Information

Susanna Hansson
Graduate Program Assistant
210 Savery, Box 353340

Faculty

Chair

Charles Hirschman

Professors

Barth, Ernest A. T. 1955, (Emeritus); Ph.D., 1955, University of North Carolina.

Becker, Howard S. * 1991; Ph.D., 1951, University of Chicago; sociology of art, sociology of science, qualitative methods.

Borgatta, Edgar F. * 1980, (Emeritus); Ph.D., 1952, New York University; methodology, social psychology, demography-ecology, aging.

Burstein, Paul * 1985; Ph.D., 1974, Harvard University; political sociology, social stratification, public policy, law.

Campbell, Frederick L. * 1966; Ph.D., 1967, University of Michigan; population and ecology, social organization.

Chirot, Daniel * 1974; Ph.D., 1973, Columbia University; modernization, political sociology, Eastern Europe.

Cook, Karen S. * 1973; Ph.D., 1972, Stanford University; experimental social psychology, theory, organizations, medical sociology.

Costner, Herbert L. * 1959, (Emeritus); Ph.D., 1960, Indiana University; methodology, social change.

Gross, Edward * 1965, (Emeritus); Ph.D., 1949, University of Chicago; formal organizations, industrial sociology, symbolic interaction, sociology of law.

Guest, Avery * 1972; MS, 1964, Columbia University; MA, 1967, Ph.D., 1970, University of Wisconsin; demography, ecology, stratification.

Hamilton, Gary G. * 1993; Ph.D., 1975, University of Washington; economic sociology, historical comparative, organizational studies, East Asia.

Hirschman, Charles * 1987; Ph.D., 1972, University of Wisconsin; demography, race and ethnic relations, social stratification, Southeast Asia.

Howard, Judith A. * 1982; Ph.D., 1982, University of Wisconsin; social psychology, gender roles.

Lang, Kurt * 1984, (Emeritus); Ph.D., 1953, University of Chicago; political and social effects of the media on mass communication.

Larsen, Otto * 1958, (Emeritus); Ph.D., 1955, University of Washington; mass communications, public opinion, collective behavior.

Locke, Hubert G. * 1976, (Adjunct); MA, 1962, University of Michigan; criminal justice, urban policy, race and ethnic relations.

Miyamoto, Frank 1941, (Emeritus); MA, 1938, University of Washington; Ph.D., 1950, University of Chicago; social psychology, collective behavior.

Patrick, Donald L. * 1987, (Adjunct); MS, 1968, Ph.D., 1972, Columbia University; aging, disablement, and health-related quality of life.

Raftery, Adrian Elmes * 1985; Doctorate, 1980, University of Paris (France); Bayesian statistics, spatial statistics, clustering, whales, sociology and demography.

Schmitt, David R. * 1968; Ph.D., 1963, Washington University; experimental social psychology, exchange relations.

Schwartz, Pepper J. * 1972; Ph.D., 1974, Yale University; family, gender, human sexuality, field methods.

Scott, Joseph W. * 1985; Ph.D., 1963, Indiana University; political sociology, family sociology, race/ethnic relations.

Stark, Rodney * 1971; Ph.D., 1971, University of California (Berkeley); scientific methods in theory and research, religion, deviance, prejudice, police.

van den Berghe, Pierre L. * 1965; Ph.D., 1960, Harvard University; comparative sociology, stratification, race and ethnic relations, kinship, sociobiology.

Wager, L. Wesley * 1954, (Emeritus); Ph.D., 1959, University of Chicago; organizations/occupations, theory, culture.

Weis, Joseph G. * 1974; DCrim, 1974, University of California (Berkeley); crime, delinquency, social control, deviance.

Associate Professors

Bridges, George S. * 1982; Ph.D., 1979, University of Pennsylvania; deviance, social control, law, and legal institutions.

Crutchfield, Robert D. * 1979; Ph.D., 1980, Vanderbilt University; deviance, criminology, social control, stratification.

Gillmore, Mary Louise 1977, (Adjunct); MS, 1970, University of Michigan; MA, 1977, Ph.D., 1983, University of Washington; adolescent sexuality and substance abuse.

Grembowski, David * 1981, (Adjunct); MA, 1975, Washington State University; Ph.D., 1982, University of Washington; dental care demand, fluoridation, dental health services research.

Kasaba, Resat * 1985, (Adjunct); Ph.D., 1985, State University of New York (Binghamton); historical sociology, world systems, social change in the Middle East.

Kashima, Tetsuden * 1976, (Adjunct); Ph.D., 1975, University of California (San Diego); sociology.

Kiser, Edgar Vance * 1988; Ph.D., 1987, University of Arizona; political sociology, theory, historical sociology.

Lavelly, William R. * 1985; Ph.D., 1982, University of Michigan; social demography of China.

Assistant Professors

Brines, Julie E. * 1993; Ph.D., 1990, Harvard University; gender, stratification, family, methods.

Conley, Darlene J. * 1991; Ph.D., 1990, Northwestern University; urban sociology, the sociology of drug abuse, philanthropic foundations.

Jepperson, Ronald L. * 1990; MSc, 1980, London School of Economics (UK); Ph.D., 1992, Yale University; social theory, political sociology, comparative and institutional sociology.

Lye, Diane Noreen * 1988; Ph.D., 1989, University of Pennsylvania; patterns of family change in developed countries.

Neuhouser, Kevin L. * 1990; Ph.D., 1990, Indiana University; political economy of developing nations (especially Latin America), gender.

Reitman, Sharon L. * 1991; Ph.D., 1991, University of Michigan; comparative historical sociology, focusing on the politics of labor movements.

Sunindyo, Saraswati 1993, (Adjunct); Ph.D., 1993, University of Wisconsin; political economy, sociology of gender, popular culture, nationalism.

Senior Lecturer

Black, Albert W. * 1972; MA, 1968, Wayne State University; Ph.D., 1976, University of California (Berkeley); race and ethnic relations, stratification, social movements, race and poverty.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

Upper-division courses (300 and 400 levels) in the Department of Sociology generally require SOC 110, *Survey of Sociology*, or equivalent, as a prerequisite, unless another prerequisite course is designated in the course description. Courses at the 400 level generally require SOC 328-329, or instructor permission, as a prerequisite.

SOC 105 Sociology of Black Americans (6) I&S
Black Sociocultural context of the Black person's environment and consequences of interaction with that environment.

SOC 110 Survey of Sociology (5) I&S Human interaction, social institutions, social stratification, socialization, deviance, social control, social and cultural change. Course content may vary, depending upon instructor. Offered: AWSpS.

SOC 195 Study Abroad: Sociology (2-5, max. 10) I&S Lower-division sociology courses for which there are no direct University of Washington equivalents, taken through a University of Washington study abroad program.

SOC 230 American Demographics (5) I&S *Lye* Recent trends in American society from a demographic perspective. Topics include: fertility, mortality, migration, urbanization, marriage, family structure, aging, labor force, education, residential segregation, and income distribution. Discussion of how demographic change relates to changes in social, economic, political, and cultural life in the contemporary United States.

SOC 240 Introduction to Social Psychology: Perspectives on Individual Behavior (5) I&S *Schmitt* Major theoretical perspectives on individual behavior in social settings. Social cognition, behaviorism, symbolic interaction, and attitudes. Ways people develop as social beings. Traditional lecture format is not used in this course. Student learning is based on individualized programs of reading and frequent tests of student comprehension. Offered: AWSp.

SOC 241 Introduction to Social Psychology: Perspectives on Social Interaction (5) I&S Major perspectives on social interaction. Social exchange, cooperation and competition, group dynamics, social influence, leadership, altruism and aggression. Situational and personal variables that determine social interaction. Traditional lecture format is not used in this course. Student learning is based on individualized programs of reading and frequent tests of student comprehension. Offered: AWSp.

SOC 260 Black Male/Female Family Relationships (5) I&S *The Black family in the United States* as a social institution. Effects of residence in a race-conscious society on the interpersonal relationships between Black men and women. Exploration of proposals for strengthening the Black family in the United States. Offered: jointly with AFRAM 260.

SOC 261 The African American Experience Through Literature (5) VLP&I&S *Instructs students in hermeneutical and sociological methods of analyses. Analyzes selected novels, essays, poems, short stories, and plays with the purpose of understanding the structures and functions of both society and personality.* Offered: jointly with AFRAM 261.

SOC 266 Introduction to Labor Studies (5) I&S *Reitman* Conceptual and theoretical issues in the study of labor and work. Role of labor in national and international politics. Formation of labor movements. Historical and contemporary role of labor in the modern world. Offered: jointly with HIST 249/POL S 249.

SOC 270 Social Problems (5) I&S Processes of social and personal disorganization and reorganization in relation to poverty, crime, suicide, family disorganization, mental disorders, and similar social problems.

SOC 271 Introduction to the Sociology of Deviance (5) I&S *Bridges, Crutchfield, Weis* Examination of deviance, deviant behavior, and social control. Deviance as a social process; types of deviant behavior (e.g., suicide, mental illness, drug use, crime, "sexual deviance," delinquency); theories of deviance and deviant behavior; nature and social organization of societal reactions; and social and legal policy issues. Offered: AWSpS.

SOC 299 Sociology Interest Group (2) I&S Provides opportunity for students new to the major, or contemplating the major, to meet twice weekly in a small group to discuss issues relating to two design-

nated five-credit sociology courses. Concurrent enrollment in the two five-credit designated courses required. See department adviser. Offered: ASP.

SOC 301 War (5) I&S *Chirot* Origins and conduct of war, readings from anthropology, political science, economics, and history, as well as two novels and some recent articles on the arms-control controversy. Modern forms of warfare, including guerrilla war, world war, and nuclear war. Offered: jointly with SIS 301.

SOC 323 Social Statistics (5) I&S, QSR

SOC 328-329 Methodology of Sociological Research (5-8) I&S, QSR Logic of formulating, testing, and modifying hypotheses. Methods of producing social data (survey research, evaluation research, field observation) and utilizing stored data (census tapes, historical materials). Methods of quantitative data analysis techniques commonly used in contemporary sociological analysis. Not open for credit to students who have taken 320 or 323. Prerequisite: at least two prior courses in sociology. Offered: AWS, WSpS.

SOC 330 Human Ecology (5) I&S Factors and forces that determine the distribution of people and institutions.

SOC 331 Population and Society (5) I&S *Guest, Lavelle, Lye* Population growth and distribution, population composition, population theory, urbanization. Determinants and consequences of fertility and mortality trends and migration in economically developed and underdeveloped areas.

SOC 340 Symbolic Interaction (5) I&S Role of language and culture in changing the human organism into a socialized human being; interpersonal processes and how they are shaped by the symbolic environment. Prerequisite: introductory course in social psychology.

SOC 341 Tutoring Sociology (2-4) Trains students to serve as tutors in designated courses. Teaches how to assist with writing assignments, explain course material, and lead group discussions. Credit/no credit only. Prerequisites: 240, 241, or equivalents.

SOC 344 Cognitive Social Psychology (5) I&S Cognitive structures and processes and their antecedents and consequences, both societal and individual. Reciprocal influences of social roles, social institutions, and social cognition. Prerequisite: 240 or equivalent or permission of instructor.

SOC 345 Collective Behavior (5) I&S Behavior of large numbers in crowds, masses, publics, and social movements where institutional definitions for joint action are minimal and the collectivity seeks to define new patterns of collective action. Prerequisite: 240 or permission of instructor or adviser.

SOC 346 Group Processes (5) I&S *Schmitt* Systematic analysis of social processes in small groups, including conformity, deviance, cooperation, competition, coalition formation, status and role differentiation, inequity, communication, and authority and power. A variety of methods of research are considered: field studies, field experiments, laboratory studies, and the simulation of social processes. Prerequisite: 240 or equivalent.

SOC 350 Contemporary American Institutions (5) I&S *Guest* Origins and development of major social institutions. Sociology of economic structure, political organization, religion, education, recreation, and other institutionalized patterns.

SOC 352 The Family (5) I&S *Lye, Schwartz* The family as a social institution. Historical changes and societal variation in family patterns. Changes over the life cycle. Alternative family forms.

SOC 353 The Family in Cross-Cultural Perspective (5) I&S *Van den Berghe* Form, content, and functions of families through case studies of different

countries. Family organization, including family structure, inheritance, sexual division of labor, and socialization with attention given to life-cycle stages. Prerequisite: 110.

SOC 354 The Comparative Study of Societies (5) I&S *van den Berghe* Entire societies at various levels of technological complexity are compared to explore problems of their development and structural organization. Both historical and contemporary Western and non-Western societies are examined. Offered: jointly with ANTH 354.

SOC 355 Social Change in Latin America (5) I&S *Neuhouser, van den Berghe* Problems of development and dependency in Latin America. Relations of power and production between social classes and ethnic groups, with special emphasis on Meso-America (Mexico, Guatemala) and the Andes (Peru, Bolivia). Prerequisite: introductory course in sociology, anthropology, political science, economics, or international studies. Offered: jointly with SISLA 355.

SOC 356 Society and Politics (5) I&S *Burstein, Jepperson, Neuhouser* Causes of political change in democratic countries, including public opinion, social movements, interest group activity, and party organization. Offered: jointly with POL S 356.

SOC 360 Introduction to Social Stratification (5) I&S Social class and social inequality in American society. Status, power, authority, and unequal opportunity are examined in depth, using material from other societies to provide a comparative and historical perspective. Sociological origins of recurrent conflicts involving race, sex, poverty, and political ideology.

SOC 361 Age and Sex Differentiation (3) I&S Physiological and social bases of age and sex differentiation in human societies. The implications of age and sex distinctions for kinship, economic, and political structures. The relationship between age, sex, and other bases of social inequality.

SOC 362 Race Relations (5) I&S Interracial contacts and conflicts.

SOC 363 Ethnicity, Business, Unions, and Society (5) I&S *Scott* Interrelationships of ethnicity, business, unions, and the larger society. Examines how the business and manufacturing sector is structured financially and sociologically, how this sector performs, and the consequences of these performances for selected ethnic groups in the United States. Prerequisites: introductory course in ethnic studies and either economics or sociology. Offered: jointly with AES 361.

SOC 364 Women in the Social Structure (5) I&S *Howard* Gender and social institutions; the family, politics, education, medicine, law, the labor force. Intersection of gender with other minority statuses such as race, age, socioeconomic status, and sexual orientation. Structural, ideological, and historical determinants of gender relations.

SOC 365 Urban Community (5) I&S *Conley, Guest* Comparative and analytic study of organization and activities of urban groups.

SOC 366 Bureaucracy in Society (5) I&S *Hamilton* The coming of organizational societies; causes of bureaucracy; informal relations and work groups; ideologies; authority and the division of labor; social change in bureaucracies; the "faceless" bureaucrat in relationship to client needs; comparative organizations; complex organizations as settings for research.

SOC 371 Criminology (5) I&S *Bridges, Crutchfield, Weis* Survey of legal definitions, types of criminal behavior, trends and patterns, recidivism, characteristics of offenders, environmental influences, diagnostic methods, prediction, theories of crime and delinquency prevention, social policy. Recommended: 271.

SOC 372 Introduction to Criminal Justice (5) I&S Examines role of police, courts, and corrections in

criminal justice. Applies sociological theories and perspectives to issues in law enforcement, adjudication, and corrections. Legislative reforms. Innovations in policy. Recommended: 271.

SOC 373 Social Factors in White Collar Crime (5) I&S *Weis* Concept and etiology of white collar crime, its forms, costs, victims, and innovative developments. Prospects for theoretical explanations and social control.

SOC 395 Study Abroad: Sociology (2-5, max. 15) I&S Upper-division sociology courses for which there are no direct University of Washington equivalents, taken through a University of Washington study abroad program.

SOC 399 Undergraduate Internship (2-5, max. 10) I&S Students serve in approved internships. Recommended for sociology majors. Credit/no credit only.

SOC 401 Special Topics in Sociology (5, max. 15) I&S Selected topics of contemporary interest taught by a sociologist active in the field. Topics vary and may be substantive, theoretical, or methodological. Prerequisite: major standing or permission of instructor.

SOC 405 Comparative Women's Movements and Activism (5) I&S Comparative cultural, national, and historical study of women's movements and activism. Critically analyzes multiple arenas of women's movements and resistance. Topics include feminism anti-racism, pre-nationalism and nationalism, economics, electoral politics, women's and human rights, and international/transnational feminisms. Prerequisites: 364 or WOMEN 205 or permission of instructor. Offered: jointly with WOMEN 405.

SOC 410 History of Sociological Thought (5) I&S Contributions of individual theorists (from Comte to the present); emphasis on cumulative development of concepts and principles, emergence of sociology as a science, probable future developments.

SOC 411 Selected Topics in History of Sociological Thought (5) I&S Specific areas or eras in the history of sociological thought. Emphasis on the development of sociological theory in relation to the intellectual and social setting of the time. Topics change from quarter to quarter. Some topics are: the development of concepts of order in sociological thought; conflict theories; the development of action theory in sociology; German sociology; Marx, Weber, and Simmel.

SOC 412 Classics of Social Research (5) I&S *Becker* Analysis of classics of social research from various subfields in sociology, designed to discover and illustrate the varieties of quality such classics exhibit.

SOC 415 Theory of Social Organization (5) I&S State and usages of theory in social organization; importance of linkage between theory and methodology; major features of social organization demonstrated by intensive examination of representative theories of social organization with particular focus on complex forms.

SOC 416 Sociological Theory (5) I&S *Jepperson, Kiser* Theories of individual action, social order, and institutional change. Cumulative development of solutions rather than on works of given theorists. Theories of social order. How sociological treatments of these issues compare with those offered by economists and other social scientists.

SOC 419- Fieldwork: Observation and Interviewing (5-) I&S *Becker* Perspective, logic, and techniques of qualitative social research and analysis. Nature and uses of intensive interviewing, participant observation, and analytic ethnography. Application of field research principles. Research project required in addition to reading and analysis of classic studies. Recommended: 240 or 352. Offered: W.

SOC 420 Fieldwork: Observation and Interviewing (5) I&S *Becker* Logic and techniques of qualitative

social research and analysis. Intensive interviewing, participant observation, qualitative data analysis (including applications of data base technology, problem reformulation, and techniques of visual documentation). Results of student work reported and discussed in class. Offered: Sp.

SOC 424-425 Applied Social Statistics (3-3) I&S *Lye* Applications of statistics in sociology and related social sciences. Emphasis on problems of analysis with imperfect data. Probability in statistical inference. Analysis of variance; contingency table analysis, nonparametric procedures; regression analysis in social research. Prerequisites: 329 for 424-; 424- for 425. Offered: W, Sp.

SOC 426 Methodology: Quantitative Techniques In Sociology (3) I&S *Raftery* Applied regression analysis with emphasis on interactive computer graphics techniques and interpretation. Application to typical sociological problems. Prerequisite: 329 or 425. Offered: A.

SOC 427 Statistical Classification and Measurement (3) I&S *Costner* Application of statistical principles and methods to problems of classification and measurement in social research. Prerequisites: 426, 428-429.

SOC 428 Principles of Study Design (3) I&S *Costner, Crutchfield, Guest* Study design from problem formulation to the analysis and interpretation of data. Prerequisite: 329. Offered: Sp.

SOC 429 Practicum In Data Analysis (3) I&S *Bridges, Crutchfield, Guest* Introduction to selected programs for data analysis and practice in their application. Practice in coordination research problem, data, and mode of analysis into a coherent, inter-related set. Interpretation of results. Prerequisite: 424-425, 428. Offered: A.

SOC 430 Urbanism and Urbanization (3) I&S *Guest, Hirschman* Human population distribution and migration patterns. Causes and consequences of world urbanization. Spatial and social patterns in the metropolis. Aggregate population movements and selectivity of migrants.

SOC 431 Fertility and Mortality (3) I&S *Lavelly, Lye* Theories of fertility and mortality, demographic transitions, individual variations. Specific analytic approaches. Familiarity with basic fertility and mortality measures, and with the life table, is assumed.

SOC 432 Population and Modernization (3) I&S *Hirschman, Lavelly* Examines role of demographic factors in the process of social modernization and economic growth. The approach is both historical, focusing on populations of developed countries since 1700, and analytic, stressing the attempts made by different disciplines to model demographic relationships, with attention to less-developed regions. Prerequisite: 331 or permission of instructor or adviser. Offered: jointly with SIS 432.

SOC 433 Research Methods In Demography (3) I&S *Hirschman* Basic measures and models used in demographic research. Sources and quality of demographic data. Rate construction, standardization, the life table, stable population models, migration models, population estimation and projection, measures of concentration and dispersion, measures of family formation and dissolution.

SOC 434 Demographic Issues In Asia (3-5) I&S *Lavelly* Contemporary Asian countries face a number of issues with demographic components, including environmental and resource issues, ethnic rivalries, international migration, and public health. This seminar addresses a set of these issues by focusing on the demography of one or more countries in Asia. Offered: jointly with SISEA 434.

SOC 442 Public Opinion (3) I&S The nature of public opinion; formation and measurement of public

opinion; the operation of public opinion polls. Recommended: 240.

SOC 443 Mass Communication (5) I&S Control, structure, and functioning of mass media of communications as a force in social life; methods of research. Recommended: 240.

SOC 445 Religious Movements: The Sociology of Cults and Sects (5) I&S *Stark* Understanding religion, what it is, and what it does. Examines the formation of new religious movements, cults, and sects, and the conditions under which they succeed or fail. Prerequisite: 110. Offered: jointly with RELIG 449.

SOC 447 Social Movements (5) I&S Social movements as collective attempts to change society: why people join; characteristics of successful and unsuccessful movements; consequences of social movement activities. Prerequisite: previous course in political sociology or political science.

SOC 449 Social Relationships (5) I&S The structure of different kinds of relationships and the nature of interaction within them. Concept of social relationships in general; several specific types of relationships. Close personal relationships: marriage, nonmarital sexual relationships, and the parent-child relationship. Prerequisites: course in social psychology and 352 or equivalent.

SOC 450 Political Economy of Women and Family in the Third World (5) I&S *Neuhouser* Theoretical and empirical aspects of the political economy of women and the family in the Third World during the process of development, with a focus on labor. Main theoretical approaches examined and applied to case studies from Asia and Latin America. Offered: jointly with SIS 450.

SOC 451 Theory and Process of Social Change (5) I&S *Hamilton* Basic trends in American life; frames of reference for analysis of social change; forces causing social change. Prerequisite: 15 credits in social sciences.

SOC 453 Social Factors in the Family (5) I&S Review and analysis of empirical research in courtship and marriage, marital adjustment, and specific areas of marriage and family life. Prerequisites: 329 and 352.

SOC 456 Political Sociology (5) I&S *Burstein, Jepperson, Neuhouser* Relationships between social change and political change. Focus on selected issues, including social bases of democracy, political organization, elections, and consequences of public policy. Prerequisites: 356, and a 200-level political science course or equivalent.

SOC 457 Sociology of Religion (5) I&S *Neuhouser* The relations between religion, polity, economy, and social structure; in particular, the political, economic, and social impact of religious beliefs and organizations, as well as the social determination of these beliefs and organizations; the rise of secularism, the rationalization of modern life, and the emergence of political quasi-religions.

SOC 460 Social Differentiation (5) I&S Analysis of societal organization based on sex, age, residence, occupation, community, class, caste, and race.

SOC 461 Comparative Ethnic Race Relations in the Americas (5) I&S *Scott* Sketches the ethnoracial systems operating in American society. Studies these systems as systems and examines their institutional and interpersonal dynamics. Compares ethnoracial systems in order to arrive at empirical generalizations about race/ethnorelations in the Americas. Offered: jointly with AES 461.

SOC 462 Comparative Race and Ethnic Relations (5) I&S *Scott* Race and ethnicity as factors of social differentiation in a number of Western and non-Western societies in Europe, Africa, Asia, and the Americas. Recommended: 362. Offered: jointly with AES 462.

SOC 464 Contemporary Society in the Peoples Republic of China (5) I&S *Lavelly* Separate development of rural and urban social institutions in the Peoples Republic of China since 1949 from a sociological perspective. Family and marriage, social control, educational institutions. Dilemmas of contemporary China and reasons for institutional change. Offered: jointly with SISEA 464.

SOC 465 Complex Organizations (5) I&S *Hamilton* Examination of the structure of complex organizations. Attention to developing generalizations applicable to industrial organizations, businesses, hospitals, prisons, labor unions, governments, universities, armies, and similar formally instituted organizations. The major focus is on empirical research, with some attention to methodological problems in studying such organizations. Prerequisite: 15 credits in sociology.

SOC 468 Industrial Sociology (5) I&S *Reitman* Changing focus of field; cultural variation, work, and the worker; technology, society, and the evolution of industrial forms; types and forms of industrial organizations; industrial organizations as social and technical systems; issues of control, process, and change; the individual in social and technical systems.

SOC 488 Sociology of Occupations and Professions (5) I&S Frameworks for study of occupations and professions; occupational structure and mobility in American society in relation to adult socialization and career development; occupational and professional associations and society. Prerequisites: 240 and 15 credits in social sciences.

SOC 489 Balkan Societies (5) I&S *Chlot* Examination of the roots of Balkan social problems (economic backwardness, minority-group conflicts, peasant problem), the failure of pre-1945 attempts to solve these problems, the post-1945 communist failures, the causes of the upheavals of 1989, and the prospects for success in the 1990's.

SOC 472 Juvenile Delinquency (5) I&S *Crutchfield, Weis* Factors in delinquency, juvenile courts. Programs of treatment and prevention. Recommended: 371 or equivalent.

SOC 473 Corrections (5) I&S *Weis* Analyzes research on diversionary methods and treatment of convicted offenders. Emphasis on program evaluation. Community treatment, fines, restitution; probation, parole, halfway houses, and other alternatives to incarceration; correctional institutions. Organization of state and federal systems. Problems of administration. Subsidies and governmental control. Planning and public participation. Prerequisite: 371 or 372. Recommended: 329. Offered: jointly with SO JU 473.

SOC 481, 482, 483 Issues in Analytic Sociology (5, max. 15; 3, max. 9; 1-3, max. 9) I&S Examination of current issues in sociological analysis. Specific content of the course varies according to recent developments in sociology and the interests of the instructor.

SOC 485 Family Change in Western Europe and the United States (5) I&S *Lye* Investigates patterns of recent family change. Explores similarities and differences in family life between Western Europe and US as well as variations among countries and among population subgroups within countries. Focuses on differences and similarities in social, economic, political, and cultural environments. Recommended: 352. Offered: jointly with EURO 485.

SOC 486 Human Family Systems: Biological and Social Aspects (5) I&S *van den Bergh* Biological bases for human mating and reproduction, and an examination of the range of cross-cultural variability in human systems of kinship and marriage. Compares wide range of human and nonhuman species, and Western and non-Western human societies. Interplay of biological, ecological, and sociocultural factors in determining the structure and function of human family systems. Offered: jointly with ANTH 486.

SOC 491 Sociology of Science (5) I&S *Becker* Sociological study of scientific activity. Social origins of scientific thought and practice, the organization of scientific work, and the process of change in science. Major theories in the area, including Merton, Kuhn, and Latour. Prerequisites: 15 prior credits in sociology; one course in physical or biological sciences.

SOC 495 Honors Senior Thesis (1-5) I&S Preparation of senior honors thesis. Sociology majors only.

SOC 496-497-498 Honors Senior Seminar ([3/5]-, [3/5]-, [3/5]) I&S *Jepperson* Exploration of selected sociological problems with emphasis on research experience and the interpretation of data. For sociology majors only, primarily for honors students. Prerequisites: senior standing and permission of instructor. Offered: A-W-Sp.

SOC 499 Undergraduate Independent Study or Research (2-8, max. 10) Credit/no credit only. Prerequisite: permission of instructor.

Courses for Graduates Only

SOC 500 Teaching Sociology as a Teaching Assistant (1) *Bridges* Techniques of quiz section administration, advising of students, and student evaluation important to successful teaching as a Teaching Assistant. Students develop presentations and classroom materials and develop and grade student examinations. Prerequisite: admission to graduate program in sociology. Credit/no credit only.

SOC 501 Proseminar (3) Introduction for first-year graduate students to substantive areas of sociology, research and information resources, and issues in graduate education and professional socialization. Credit/no credit only. Offered: A.

SOC 502 Seminar on Teaching Sociology (3) Techniques of lecturing, leading discussion, evaluating student performance, and other pedagogical skills ancillary to successful teaching. Students develop a course and obtain videotaped feedback of presentations. Prerequisite: completion of MA. Offered: W.

SOC 503 Seminar on Writing Social Science (3) *Becker, Burstein, Howard* Techniques, skills, and strategies helpful for publishing in the social sciences. Includes writing and revision of own work and evaluation of the writing of other students. Also includes social scientific analysis of writing and other forms of academic communication. Prerequisite: completion of MA. Offered: A.

SOC 510 Seminar in Sociological Theory (3) *Jepperson, Kiser* Macrosociological theories; functionalism and neoevolutionism; conflict and consensus approach; comparative strategies; models and long-range theories; ideology and sociology. From Marx and de Tocqueville to contemporary literature. Offered: A.

SOC 511 Classical Social Theory (3) Study of classical masters of social theory; Marx, Durkheim, Weber, and Simmel.

SOC 513 Demography and Ecology (3) *Hirschman, Lye, McCann* Theories and research on human fertility, mortality, mobility, migration, and urbanization in social/economic context. Comparative and historical materials on Europe, the United States, and the Third World.

SOC 514 Current Theories in Social Psychology (3) *Cook, Howard, Schmitt* Broad graduate-level introduction to the theories in the field of social psychology.

SOC 515 Current Research in Social Psychology (3) *Howard* Broad graduate-level introduction to the research in the field of social psychology.

SOC 516 Organizations (3) *Cook, Hamilton* Broad graduate-level introduction to the theory and research on complex organizations.

SOC 517 Deviance and Social Control (3) *Bridges, Crutchfield, Weis* Survey of current research on deviant behavior and mechanisms of social control; definitions and forms of deviant behavior, causal analysis, and legal or other methods of social control.

SOC 518 Social Stratification (3) *Burstein, Guest* Intensive preparation in theoretical, methodological, and substantive topics in social stratification.

SOC 519 Social Change (3) *Burstein* Basic perspectives in the study of social change. Classical works and exemplary contemporary contributions in the literature.

SOC 525 Experimental Methods in Social Research (3) For graduate students who wish additional understanding of techniques, problems, and issues involved in the design and conduct of experimental social research. Considers strengths and weaknesses of various experimental designs, artifacts and their control, problems in going from the laboratory to the field, and ethical issues. Prerequisites: 424-425 and 428, 429, or equivalents.

SOC 526 Causal Approach to Theory Building and Data Analysis (3) Theory construction and testing from a causal models perspective. Path analysis, standardized versus unstandardized measures, feedback models, identification problems, estimation in overidentified models, difference equations, differential equations, stability conditions. Multiplicative models as alternatives to additive ones. Causal approach to measurement error.

SOC 527 Measurement of Basic Sociological Concepts (3) Conceptualization and measurement problems in sociology, using major concepts as illustrations of basic issues. Causal approach to measurement to deal with problems of indirect measurement, cross-level measurement problems, aggregation and disaggregation. Consequences of crude measurement for data analyses. Prerequisite: 424. Recommended: 426.

SOC 528 Seminar on Selected Statistical Problems in Social Research (3) *Costner, Raftery* Prerequisite: 426.

SOC 529 Multiple Indicators in Social Measurement (3) *Costner* Repeated measures, alternate measures and multiple observers in estimating the reliability, assessing the validity, and analyzing conceptual and indicator problems in social measurement. Implications of measurement error for research conclusions. Prerequisites: 424, 426.

SOC 536 Log-Linear Modeling and Logistic Regression for the Social Sciences (3) *Raftery* Log-linear modeling of multidimensional contingency tables. Logistic regression. Applications to social mobility, educational opportunity, and assortative marriage. Applied and computing focus. Prerequisite: 425 or STAT 395 or permission of instructor. Offered: jointly with STAT 536.

SOC 539 Selected Topics in Demography and Ecology (3, max. 9) Specialized problems in demography or ecology are covered; for example, migration, fertility, mortality, language, race and ethnic relations, metropolitan community. See quarterly announcement for specific problem to be covered.

SOC 542 Selected Topics in Group Processes (3) *Cook, Schmitt* Theories, methodology, and studies in the area of small-group research. Prerequisite: permission of instructor for nonmajors.

SOC 544 Seminar on Social Power (3) Examination of basic principles concerning power, influence, and authority in small groups, organizations, and communities. Recommended: 240, 415, 460.

SOC 546 Seminar on Symbolic Interaction (3) Focuses on several key areas in, and related to, the symbolic interactionist perspective (e.g., language, the self, the dramaturgic perspective, ethnomethod-

ology, stigma, the social construction of social problems). Prerequisite: permission of instructor for nonmajors.

SOC 547 Social Cognition and Attribution (3) *Howard* Theories and research on social cognition and attribution. Theoretical and methodological debates on cognition. Sociological aspects of attribution. Prerequisite: 514 or equivalent.

SOC 550 Changing Patterns of Family Organization (3) *Schwartz* History of the family with emphasis on changes in European and American families since 1600. Concomitant changes in other institutions and their relation to changes in the family.

SOC 551 Family and Gender Relations (3) *Lye, Schwartz* Overview of major research findings on marriage and the family, including demographic trends, the place of children in society, courtship, divorce, and gender roles.

SOC 554 Seminar in the Sociology of Religion (3) Survey of significant and active areas of theory and research in contemporary social scientific studies of religion.

SOC 555 Methods in Macro, Comparative, and Historical Sociology (3) *Chirot*

SOC 556 The Evolution of the Family (3) *van den Berghe* Biological evolution of species-specific behaviors and forms of sociality linked to human mating, reproduction, and parenting. Cultural evolution of human systems of kinship and marriage as fitness-maximizing adaptations to a wide range of habitats. Prerequisite: upper-division course in evolutionary theory, population genetics, behavioral ecology, primatology, or animal behavior. Offered: jointly with ANTH 556.

SOC 559 Seminar on Sociology of Gender Roles (3) *Brines, Howard, Lye* Theoretical issues concerning gender and society. Current state of empirical knowledge on the sociology of gender and strategies for research. Cross-cultural variations in gender roles, how these develop in people, how gender roles develop in society and their effects on social structure, social institutions, and interaction. Prerequisite: graduate standing in a social science. Offered: alternate years.

SOC 561 Society, Chronic Illness, and Disability (3) *Durham, Hadrick* Multidisciplinary perspectives of chronic disease and disability throughout the life course, including illness behavior and the sick role; aging and disablement; behavior change; methodological approaches in research; disability policy. Prerequisite: 510 or permission of instructor. Offered: jointly with HSERV 583; Sp.

SOC 562 Seminar in Comparative Race Relations (3) *van den Berghe* Cross-cultural approach to race and ethnic relations, including case studies from Africa and Latin America. Prerequisite: graduate standing in social sciences.

SOC 566, 567 Seminar in Complex Organizations (3, 3) Special topic seminars in the field of complex organizations or industrial sociology.

SOC 568 Social Mobility (3) Description and measurement of social mobility. Determinants of mobility and cross-national comparisons. Consequences of mobility for social behaviors. Emphasizes movement from the socioeconomic position of family of origin to adult position. Prerequisite: 518.

SOC 569 Demographic Studies of Stratification (3) *Guest, Hirschman* Overview of development of models of socioeconomic achievement ("status attainment" paradigm) in the field of stratification. Begins with work of Blau and Duncan. Covers elaboration of basic models to include race and ethnicity, social psychological variables, class, school and labor market effects, and other structural variables. Prerequisites: 513, 518.

SOC 574 Seminar in Methods of Criminological Research (3) *Bridges, Weis* Provides training in the technical analysis of published research in criminology; designs and processes studies in parole prediction, prediction of prison adjustment, and prediction of treatment effect.

SOC 581 Special Topics in Theory and the History of Sociological Thought (3, max. 9) Examination of current topics in theory and the history of sociological thought. Content varies according to recent developments in the field and the interests of the instructor.

SOC 582 Special Topics in Research Methods and Statistical Analysis in Sociology (3, max. 9) Examination of current topics in research methods and statistical analysis in sociology. Content varies according to recent developments in the field and the interests of the instructor.

SOC 583 Special Topics in Demography and Ecology (3, max. 9) Examination of current topics in demography and ecology. Content varies according to recent developments in the field and the interests of the instructor.

SOC 584 Special Topics in Social Psychology (3, max. 9) Examination of current substantive topics in social psychology. Content varies according to recent developments in the field and the interests of the instructor.

SOC 585 Special Topics in Marriage and Family (3, max. 9) Examination of current substantive topics in marriage and the family. Content varies according to recent developments in the field and the interests of the instructor.

SOC 586 Special Topics in Organization and Industrial Sociology (3, max. 9) *Reitman* Examination of current substantive topics in organizational and industrial sociology. Content varies according to recent developments in the field and the interests of the instructor.

SOC 587 Special Topics in Deviance and Social Control (3, max. 9) Examination of current substantive topics in deviance and social control. Content varies according to recent developments in the field and the interests of the instructor.

SOC 588 Special Topics in Stratification and Race Relations (3, max. 9) Examination of current substantive topics in stratification and race relations. Content varies according to recent developments in the field and the interests of the instructor.

SOC 589 Special Topics in Macrosociology (3, max. 9) Examination of current substantive topics in macrosociology. Content varies according to recent developments in the field and the interests of the instructor.

SOC 590 Special Topics in Sociology (3, max. 9) Examination of current substantive topics in sociology. Content varies according to recent developments in the field and the interests of the instructor. Topics covered in courses with this number lie outside those covered by other special topics courses numbered 581 through 589.

SOC 591 Political Sociology (3) Introduction to political sociology, considering the rise of the modern state, power, political organization, social movements, and other related topics.

SOC 600 Independent Study or Research (*) Credit/no credit only.

SOC 700 Master's Thesis (*) Credit/no credit only.

SOC 800 Doctoral Dissertation (*) Credit/no credit only.

South Asian Studies

See International Studies.

Southeast Asian Studies

See International Studies.

Speech and Hearing Sciences

210 Eagleson

The speech and hearing sciences concern the processes and disorders of verbal communication. The undergraduate programs include the study of normal language development, speech acoustics, speech physiology and perception, hearing, the nature of language, speech and hearing disorders in children and adults, and the clinical processes involved in identification, prevention, and remediation of those disorders.

Undergraduate Program

Director of Student Services
Melissa Johnson
202 Eagleson

Bachelor of Science

Admission Requirements: 2.50 overall GPA. Recommended preparation includes high school physics or equivalent; introductory exposure to human learning and sensory, perceptual, and cognitive processes; general physiology and the physiology of behavior; and college mathematics. Students who meet admission requirements are eligible for one of two options: *Option I, General Academic* is intended to provide broad perspectives of the discipline, but not to prepare students specifically for careers in the speech and hearing sciences. It is appropriate for students with interests in education, health care, and communication. *Option II, Speech and Hearing Sciences and Disorders* is intended for students interested in speech and hearing sciences and clinical speech-language pathology and audiology.

Major Requirements

Core requirements for both options: 36 credits in the following courses—SPHSC 250, 261, 302, 303, 304, 305, 320, 371, 461. 3.00 GPA in core courses for students following Option II.

Option I, General Academic: Core requirements listed above; 17 credits from the following: SPHSC 308, 405, 406, 425, 445, 462, 499; ZOOL 118; a college-level mathematics (not including MATH 100, 101, 102, 103) or statistics course.

Option II, Speech and Hearing Sciences and Disorders: Core requirements listed above; SPHSC 308, 405, 406, 425, 445, 471, 481; ZOOL 118; a college-level mathematics (not including MATH 100, 101, 102, 103) or statistics course; minimum 9 credits at the 200 level or above in psychology, educational psychology, special education, and/or linguistics.

Graduate Program

Lesley B. Olswang, Graduate Program Coordinator

The Department of Speech and Hearing Sciences offers the Master of Science and Doctor of Philosophy degrees. The program consists of a wide range of course work and seminars providing opportunities for the development of scholarly and professional competence in various areas of specialization: language acquisition; phonology; speech production and transmission; hearing; psychoacoustics; speech perception; computer recognition and generation of meaningful speech; and human communication disorders related to language, speech, and hearing and the clinical procedures involved in their identification, prevention, and remediation. To complement departmental curricula in various specialization areas, close interdisciplinary relationships are maintained with other University departments and off-campus centers. Advanced degrees in the speech and hearing sciences equip the student to do research, to teach at the college and university level, and to provide clinical services to the communicatively impaired.

Special Requirements

Prospective candidates for advanced degrees are expected to have earned 50-60 credits in the speech and hearing sciences at the undergraduate level, depending upon the specific area of graduate specialization chosen. The M.S. degree is intended primarily for students who desire careers as speech-language pathologists and audiologists, but who may or may not continue study for the Ph.D. degree. Students complete the academic and practical experience requirements for the Certificate of Clinical Competence of the American Speech-Language-Hearing Association. Students must also meet all Graduate School requirements for the master's degree. A thesis is optional. A non-clinical M.S. degree, requiring a thesis, may be designed as well. (Please contact the Graduate Program Coordinator.) For the Ph.D. degree, individually tailored programs of study are developed to focus on specialized areas of interest within speech science, experimental and clinical audiology, and speech/language pathology.

Financial Aid

A number of teaching and research assistantships are available for qualified graduate students. In addition, the department has traineeships/fellowships supported by the U.S. Department of Education, the National Institutes of Health, and the Department of Veterans Affairs.

Research Facilities

The department's research laboratories, as well as those of the Virginia Merrill Bloedel Hearing Research Center, contain sophisticated equipment for the collection and analysis of data related to the study of human communication and its disorders. The University Speech and Hearing Clinic and the Center on Human Development and Disability also provide laboratories to support applied research in communication processes and remedial procedures.

Correspondence and Information

Graduate Program Assistant
210 Eagleson, Box 354875

Faculty

Chair

Patricia K. Kuhl

Professors

Dale, Philip S. * 1968, (Adjunct); PhD, 1968, University of Michigan; psycholinguistics, language and cognitive development in normal and exceptional children.

Folsom, Richard C. * 1976; PhD, 1979, University of Washington; pediatric audiology, auditory evoked potentials.

Gates, George A. 1993, (Adjunct); MD, 1959, University of Michigan; otology/neurotology, cochlear implantation.

Kuhl, Patricia K. * 1976; MA, 1971, PhD, 1973, University of Minnesota; speech perception.

Miner, Adah L. 1965, (Emeritus); MA, 1948, University of Washington; PhD, 1962, University of Wisconsin; speech pathology, clinical supervision.

Minifie, Fred D. * 1971; PhD, 1963, University of Iowa; speech acoustics.

Olswang, Lesley B. * 1977; PhD, 1978, University of Washington; language development and disorders/clinical processes.

Palmer, John M. * 1952, (Emeritus); PhD, 1952, University of Michigan; disorders of voice and orofacial deformities, anatomy of speech.

Prins, David * 1969, (Emeritus); PhD, 1961, University of Michigan; fluency disorders.

Stoel-Gammon, Carol * 1984; PhD, 1974, Stanford University; developmental phonology and phonetics.

Thompson, Gary * 1966, (Emeritus); PhD, 1967, University of Minnesota; pediatric audiology, clinical evaluation.

Thompson, Marie D. * 1979, (Emeritus); PhD, 1970, University of Washington; special education (hearing impaired).

Wilson, Wesley * 1966, (Emeritus); PhD, 1969, University of Washington; audiology, infant assessment and aural rehabilitation.

Yantis, Phillip A. * 1965, (Emeritus); PhD, 1955, University of Michigan; audiology, clinical evaluation.

Yorkston, Kathryn * 1975, (Adjunct); PhD, 1975, University of Oregon; neurogenic communication disorders in adults.

Associate Professors

Burns, Edward M. * 1984; PhD, 1977, University of Minnesota; psychoacoustics.

Carpenter, Robert L. * 1970; PhD, 1969, Northwestern University; language and language disorders.

Coggins, Truman E. * 1974; PhD, 1976, University of Wisconsin; language disorders in children.

Cooker, Harry S. * 1976, (Emeritus); PhD, 1963, University of Iowa; speech physiology.

Norton, Susan J. * 1991, (Adjunct); PhD, 1982, University of Washington; normal and non-normal hearing, specifically cochlear mechanics, in humans and animals.

Reich, Alan R. * 1977; PhD, 1975, University of Iowa; speech physiology and voice disorders.

Strand, Edythe A. * 1990; PhD, 1987, University of Wisconsin; neurogenic speech/language disorders.

Werner, Lynne A. * 1986; PhD, 1980, Loyola University (Chicago); auditory development, infant psychoacoustics.

Assistant Professors

Feeney, Martin P. 1986, (Adjunct); MA, 1979, Washington State University; PhD, 1993, University of Washington; audiology.

Moore, Christopher A. 1995; MA, 1981, PhD, 1985, Purdue University; speech physiology.

Rogers, Margaret A. 1992; PhD, 1992, University of Iowa; neurogenic speech/language disorders.

Lecturers

Alarcon, Nancy B. 1988; MS, 1981, University of Wisconsin; speech-language disorders/adult.

Branson, Cynthia J. 1974; MA, 1970, Northwestern University; speech-language disorders/child.

Coggins, Kathleen B. 1984; MS, 1974, University of Wisconsin; speech-language disorders/child.

Labiak, James M. 1974; MA, 1971, University of Washington; audiologic evaluation/calibration.

Sanborn, E. Sue 1988; MA, 1967, PhD, 1971, University of Washington; clinical audiology/aural rehabilitation.

Stone-Goldman, Judith R. 1980; PhD, 1986, University of Washington; language development and disorders, counseling.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

SPHSC 100 Voice and Articulation Improvement (3) VLPA For native speakers of English only. Voice production and the sound system of standard American speech. Speech standards, regional and social dialects, voice quality and basic language-oriented characteristics. Practice for improving speech style. Offered: AWSp.

SPHSC 111 The American English Sound System (2, max. 4) For non-native speakers of English only. Speech sounds of American English. Practice in listening and using American phonetic features. Credit/no credit only. Prerequisite: college-level reading knowledge of English. Offered: AWSps.

SPHSC 250 Human Communication and Its Disorders (5) I&S/NW Normal and disordered oral communication. Includes speech, language, and hearing disorders as well as normal processes. Required for majors, open to nonmajors. Offered: A.

SPHSC 281 The Nature of Sound (3) NW Fundamental principles of sound and vibration with emphasis on examples relevant to the speech and hearing systems. Required for majors; open to non-majors. Prerequisite: MATH 101 or equivalent. Offered: A.

SPHSC 300 Speech Science (4) NW Basic physiological and acoustical attributes of normal speech and hearing. Must be taken concurrently with 301. Offered: AWSp.

SPHSC 301 Laboratory in Speech Sciences (1) NW Basic physiological and acoustical attributes of normal speech and hearing. Must be taken concurrently with 300. Offered: AWSp.

SPHSC 302 Phonetics (2) VLPA Introduction to the description and classification of speech sounds with a focus on American English. Phonetic analysis of segmental and suprasegmental properties of speech. Practice using the International Phonetic Alphabet to transcribe normal and disordered speech patterns. Required for majors; open to non-majors. Offered: A.

SPHSC 303 Language Science (3) VLPA Introduction to techniques of linguistic analysis used in the study of phonology, morphology, syntax, and semantics. Required for majors; open to non-majors. Offered: A.

SPHSC 304 Developmental Aspects of Communication (5) I&S Patterns of communicative development in English speaking children and adolescents. Introduction to the study of language and communication from a developmental perspective. Application to children with various types of communication impairments. Required for majors; open to non-majors. Prerequisites: 303 or equivalent. Offered: Sp.

SPHSC 305 Speech and Language Disorders (5) NW Etiology and nature of developmental and acquired communication disorders across the lifespan. Behavioral characteristics of language delay and disorders, developmental apraxia of speech, phonological disorders, stuttering, acquired aphasia and apraxia of speech, craniofacial anomalies, and voice disorders.

ders. Required for majors; open to non-majors. Prerequisite: 250 or permission of adviser. Offered: W.

SPHSC 308 Social-Cultural Aspects of Communication (3) I&S Introduction to human communication in context. Exploration of ways communication is influenced by context, including situational variables, social/interpersonal relationships, and culture. Students gain skills in observing a variety of communication behaviors in different contexts. Required for majors; open to non-majors. Offered: SpS.

SPHSC 320 Anatomy and Physiology of Speech (5) NW Anatomy and physiology of the respiratory, laryngeal, and articulatory systems. Examples and laboratory work are directed toward clinical issues in Speech-Language Pathology. Required for majors; open to non-majors. Offered: WSp.

SPHSC 371 Hearing Disorders (3) I&S/NW Introduction to abnormal hearing. Pathologies of the ear and their treatments. Audiometric correlates, communicative and social consequences of hearing loss. Overview of management of children and adults. Required for majors; open to non-majors. Offered: W.

SPHSC 391 Practicum in Audiology (1-4, max. 10) Guided experiences in audiological assessment and aural rehabilitation of children and adults. Credit/no credit only. Prerequisite: permission of instructor. Offered: AWSpS.

SPHSC 405 Diagnosis of Speech and Language Disorders (3) NW Principles and procedures for the diagnosis of speech and language disorders. Required for majors. Prerequisites: 304 and 305. Offered: WSp.

SPHSC 406 Treatment of Speech and Language Disorders (3) NW Principles and procedures for planning, implementing, and evaluating treatment for speech and language disorders. Required for majors. Prerequisite: 405. Offered: SpS.

SPHSC 411 Perceptual Development (5) I&S/NW Origins and development of perception in human infancy. Object, face, and speech perception; cross-modal relations between touch, vision, audition. Prerequisite: 306 or 414 or at least one course in speech and hearing sciences and junior or senior standing. Offered: jointly with PSYCH 411.

SPHSC 425 Speech, Language, and the Brain (5) NW Historical perspectives and current research on speech acoustics, speech perception, and brain processing of speech information; speech development; techniques used in speech analysis; machine recognition of speech; brain imaging techniques, animal communication systems; speech evolution; implications for impaired populations. Prerequisite: 320 or permission of advisor. Offered: A.

SPHSC 445 Models of Speech Processing (3) NW Examines models and basic issues concerning how spoken language is processed. Presents current issues, theories, and research relative to the levels of processing entailed in producing and comprehending speech. Prerequisites: 302, 303, 320, and 425 or permission of advisor. Offered: SpS.

SPHSC 449 Special Studies in Speech Pathology and Audiology (* max. 30) Selected special problems in speech pathology and audiology. Prerequisites: vary by topic. Offered: Irregularly.

SPHSC 453 Communication Augmentation for Non-Speaking Individuals (3) NW Communication needs of nonspeaking individuals. Interdisciplinary approaches to the evaluation, selection, and implementation of aided and unaided communication augmentation systems. Prerequisite: basic course work in either speech and hearing sciences, physical therapy, occupational therapy, or engineering, or permission of instructor. Offered: jointly with REHAB 458; irregularly.

SPHSC 481 Introduction to Hearing Science (5) NW Basic aspects of hearing and the properties of the ear and nervous system responsible for them. Mechanisms by which the auditory system constructs an image of the acoustic environment. How attention and memory influence hearing. Effects of damage to the auditory system. Required for majors; open to nonmajors. Prerequisite: 261. Offered: WSp.

SPHSC 482 Hearing Development (3) NW Description of the changes that occur in human hearing during development. Consideration of the possible explanations for early immaturity. Prerequisite: 461. Offered: A.

SPHSC 471 Basic Audiometry (5) NW Theory and practice of the assessment of hearing function, including standard pure-tone audiometry, speech audiometry, and basic impedance audiometry. Required for majors. Prerequisites: 320, 371, and 461. Offered: ASp.

SPHSC 481 Management of Hearing Loss (3) NW Introduction to methods of communicative rehabilitation of person with hearing loss. Remediation principles of auditory and visual perception, amplification, communication strategies, and information counseling. Required for majors. Prerequisites: 371 and 471. Offered: WS.

SPHSC 491 Audiology Practicum in Schools (2) Special projects in clinical audiology practicum, offered only in the school setting. Provides an opportunity for students to extend audiology practicum experiences into the school environment. Prerequisite: 471. Offered: AWSpS.

SPHSC 499 Undergraduate Research (1-5, max. 15) Prerequisite: permission of instructor. Offered: AWSpS.

Courses for Graduates Only

SPHSC 500 Clinical Methodology for Documenting Change (4) Introduction to clinical methodology for examining efficacy of treatments for individuals with communication problems. Students consider nature of intervention designed to alter communication disorders and types of accountability questions that need to be raised. They learn methodology for collecting and analyzing data to document effectiveness, effects, and efficiency of treatments.

SPHSC 501 Neural Bases of Speech, Language, and Hearing (4) Neuroanatomical and neurophysiological bases of language, hearing, sensory, and motor function. Special emphasis given to brain behavior correlates and behavioral consequences to speech, language, and hearing as a result of neurologic injury or disease.

SPHSC 502 Advanced Anatomy of Speech and Hearing Structures (2) Directed independent dissection and study of selected anatomic structures of the speech or hearing mechanisms. Prerequisites: permission of instructor.

SPHSC 503 Current Issues in Speech and Hearing Sciences (3) Application of experimental methods to research in speech and hearing sciences.

SPHSC 504 Research Methods in Speech and Hearing Sciences (3) Introduction to empirical methods in the speech and hearing sciences.

SPHSC 505 Clinical Research in Communication Disorders (3) Introduction to clinical research. Methodological issues concerning the evaluation of treatment for speech, hearing, and language disorders. Primary emphasis on time series designs. Prerequisite: 504 or permission of instructor.

SPHSC 510 Physiological Acoustics (3) Study of pertinent literature and experimental techniques incident to the scientific study of the normal and abnormal auditory system. Prerequisites: 461 and familiarity with algebra and trigonometry.

SPHSC 511 Psychoacoustics (3) Review of significant literature and theory pertinent to normal auditory sensitivity, pitch, loudness, and other attributes of auditory sensation. Prerequisites: 461 or permission of instructor; MATH 120 or equivalent.

SPHSC 514 Speech Physiology (3) Study of the physiological parameters of acoustic speech production. Prerequisites: permission of instructor.

SPHSC 515 Speech Acoustics (3) Study of the acoustical correlates of the distinctive parameters of speech. Prerequisites: 514; or permission of instructor.

SPHSC 516 Speech Perception (3) Study of the perceptual and linguistic parameters of speech perception. Prerequisites: 515 or permission of instructor.

SPHSC 519 Seminar in Speech Science (2, max. 6)

SPHSC 520 Advanced Instrumentation for Speech and Hearing Sciences (3) Design and use of electronic and electroacoustic devices in the speech and hearing sciences. Four hours of laboratory required each week.

SPHSC 521 Instrumentation for Audiology (5) Introduction to basic instrumentation used in audiology and hearing science; detailed instruction in audiometer calibration including a review of current national and international standards pertinent to audiology; emphasis on use rather than theory. Prerequisite: permission of instructor.

SPHSC 525 Speech Signal Processing (3) Theory, evaluation, and use of speech signal processing algorithms such as sampling, filtering, spectral analysis, autocorrelation, and speech synthesis. Laboratory assignments develop skills in using signal analysis and synthesis software applied to normal and pathological speech.

SPHSC 530 Language Disorders in Children (4) Consideration of the nature of language impairment in children, the types of children in whom language impairment is an important dimension, and approaches to treatment.

SPHSC 531 Neurogenic Motor Speech Disorders (4) The nature of apraxia of speech and dysarthria and the assessment and treatment of those disorders. Prerequisite: 501 or permission of instructor.

SPHSC 532 Neurogenic Language Disorders (4) Nature of aphasia and other neurogenic language disorders; evaluation and treatment of those disorders. Prerequisite: 501 or permission of instructor.

SPHSC 533 Medical Speech Pathology (2) Nature of speech pathology practiced in medical settings. Prerequisites: 501, 531, 532, and 535 or permission of instructor.

SPHSC 534 Dysphagia and Associated Disorders (3) Anatomic/physiologic bases of function and dysfunction associated with speech-language disorders. Mastication and swallowing problems, their causes, assessments, and management. Prerequisites: 501 or permission of instructor.

SPHSC 535 Voice and Resonance Disorders (4) Physiology, acoustics, and perception of voice quality and speech resonance. Etiology, evaluation, and treatment of voice and resonance disorders.

SPHSC 536 Assessment of Language Impairment in Children (4) Principles and procedures used in the assessment of speech- and language-disordered children and adolescents.

SPHSC 537 Fluency Disorders (4) Characteristics of fluent speech and the nature and treatment of stuttering in children and adults are studied in relation to normal speech production processes, human learning, principal explanations of stuttering, and treatment systems.

SPHSC 538 Management of Acquired Cognitive Disorders (2) Epidemiology, neuropathology, assessment, and management of acquired cognitive disorders. Focus on traumatic brain injury in adults and children, dementia, and right brain injury. Prerequisites: 501 and 532 or permission of instructor.

SPHSC 539 Articulation and Phonological Disorders (4) Patterns of normal phonological development. Nature, assessment, and treatment of phonological disorders.

SPHSC 540 Phonological Development (3) Selected topics in the developmental sequence of phonological systems in normal-speaking children. Relationships between possible phonological inventories and rule systems in different languages. Prerequisites: LING 451, 452, or permission of instructor. Offered: jointly with LING 540.

SPHSC 541 Syntactic and Semantic Development (3) Advanced topics in the study of first-language acquisition by children, including cognitive bases of language, cross-linguistic research, early semantic systems and their reorganization, learnability theory, and other theories of acquisition. Prerequisite: LING/PSYCH 447 or permission of instructor. Offered: jointly with LING 541.

SPHSC 542 Counseling and Interactive Skills for Speech-Language Pathologists and Audiologists (2/3) Introduction to counseling theory and practice in speech-language pathology, audiology, and related fields. Provides opportunities for learning and practicing counseling skills. Addresses key counseling issues, including professional boundaries, intense emotions, and counselor's feelings and reactions. Prerequisite: graduate standing or permission of instructor.

SPHSC 550 Educational Speech-Language Pathology and Audiology (3) Study of administrative and clinical issues in implementation of programs to remediate communication disorders in the school-aged population. Field experiences and professional issues. Open to nonmatriculated students with permission of director of student services. Prerequisite: graduate student in speech and hearing sciences or permission of instructor.

SPHSC 551 Advanced Practicum in Speech Pathology Evaluation (1-9, max. 10) Laboratory experience in the evaluation of speech and language disorders. Credit/no credit only. Prerequisites: 536 and permission of instructor.

SPHSC 552 Advanced Practicum in Speech Pathology Management (1-9) Laboratory experience in the management of speech and language disorders. Credit/no credit only. Prerequisite: permission of instructor.

SPHSC 555 Preinternship in Speech and Hearing Sciences (1-9) Practicum in speech pathology or audiology designed to teach the clinical regimen of a participating professional center prior to assuming a full internship assignment. Credit/no credit only.

SPHSC 556 Seminar in Speech-Language Development (2, max. 6) Prerequisites: permission of instructor.

SPHSC 559 Seminar in Speech-Language Pathology (2, max. 6)

SPHSC 570-571 Assessment of Auditory Dysfunction I, II (4-4) Strategies and procedures in the auditory evaluation of hearing-impaired adults. Laboratory required. Prerequisite: 471 or equivalent.

SPHSC 572 Pediatric Audiology (3) Assessment of auditory disorders in infants and young children. Emphasis on behavioral and physiologic assessment techniques and on the role of the audiologist in the clinical management of the young hearing-impaired child. Prerequisite: 471 or equivalent.

SPHSC 573 Electrophysiologic Assessment of Auditory Function (4) Consideration of electrophysiologic techniques that may be used to evaluate the normal and disordered auditory system. Outside laboratory required. Prerequisite: 461 and 571 or permission of instructor.

SPHSC 574 Assessment of Balance Function (4) Examines normal anatomy and physiology of the peripheral and central vestibular system. Reviews peripheral and central vestibular disorders and treatment protocols. Major focus of assessment on electronystagmography with associated lab. Provides overview of rotational and posturography measures of balance function. Prerequisite: permission of instructor.

SPHSC 575 Medical Backgrounds in Audiology (3) Diseases and injuries of the ear resulting in reduced audition. Prerequisite: 571 or permission of instructor.

SPHSC 580 Rehabilitative Audiology (3) Explores technology to enhance communication effectiveness of hearing impaired persons. Selection and training in the use of assistive systems and cochlear implants. Advanced perception assessment and training methodology. Prerequisites: 571 and 583.

SPHSC 581 Management of Hearing-Impaired Children (3) Management of hearing-impaired children, including identification of target behaviors and methods for modification such as individualized therapy programs and parent and teacher involvement.

SPHSC 582 Hearing Aid Amplification (4) Acoustic amplification and methods of determining electroacoustic characteristics. Includes earmold technology. Prerequisites: 471 and 570 or permission of instructor.

SPHSC 583 Hearing Aid Selection (4) Consideration of strategies utilized in selecting acoustic amplification for the hearing impaired, including review of pertinent research literature. Prerequisite: 582 or permission of instructor.

SPHSC 584 Industrial and Community Hearing Conservation (2) Psychophysiological effects of environmental noise on man. Techniques of noise measurement and attenuation, including the planning of hearing conservation programs in industry and in the community. Prerequisite: 471 or permission of instructor.

SPHSC 588 Audiology Proseminar (1, max. 3) Consideration of professional issues and student/faculty research in specific areas of interest. Credit/no credit only.

SPHSC 589 Seminar in Audiology (2, max. 6) Prerequisite: permission of instructor.

SPHSC 591 Advanced Practicum in Audiology (1-9, max. 10) Credit/no credit only. Prerequisite: permission of instructor.

SPHSC 599 Research Practicum (* max. 12) Supervised laboratory experience in experimental approach to problems in speech and hearing sciences. Prerequisite: permission of instructor.

SPHSC 600 Independent Study or Research (1, max. 9) Prerequisite: permission of instructor.

SPHSC 601 Internship (3-9) Supervised field experiences in settings other than public schools. Credit/no credit only. Prerequisite: permission of instructor.

SPHSC 602 Internship in the Schools (3-9) Supervised field experience in a public school setting. Credit/no credit only. Prerequisite: permission of instructor.

SPHSC 700 Master's Thesis (1, max. 9)

SPHSC 800 Doctoral Dissertation (1, max. 9)

Speech Communication

205 Raitt

Speech communication is the study of the ways people share meanings and ideas in face-to-face interaction and in other forms of discourse. The major in speech communication is designed to enable students (1) to enhance their theoretical knowledge by understanding speech communication as a form of behavior, a social activity, and an aesthetic endeavor, (2) to improve their critical faculties through analysis of communicative behavior and discourse, and (3) to develop their abilities to apply theory to the practice of communication skills.

Undergraduate Program

Advisers

Robert M. Post
Beatrice Restoule
206B Raitt

Students in the department begin their study in introductory courses in public speaking, interpersonal communication, oral interpretation, and small-group decision making. In advanced courses, students study and analyze specialized forms of communication—persuasion, argumentation, small-group facilitation, and communication in instructional settings and large organizations.

Bachelor of Arts

Admission Requirements: A minimum of 30 quarter credits completed and a minimum 2.50 overall GPA (2.50 guarantees consideration, but not acceptance). Recommended courses include at least 5 credits in each of the following areas: (1) English composition; (2) quantitative/symbolic reasoning; (3) Visual, Literary, & Performing Arts; (4) Individuals & Societies; and (5) the Natural World. Students submit an application packet that includes (1) application form; (2) current class schedule; (3) copies of transcripts and grade reports; (4) original statement. Applications are due the end of the third week of the quarter. Admission is once a quarter—autumn, winter, and spring.

Major Requirements: 60 approved credits, including (1) core requirements (33 credits): 10 credits from SP CMU 103, 140, 220; 5 credits from 334, 373; 15 credits from 270, 305, 310, 476; and 400. (2) electives (27 credits): 15 credits of electives must be in courses at the 400 level, excluding 499. 2.50 GPA for all speech courses taken.

Minor

Minor Requirements: 30 credits including at least 5 credits in theory (SP CMU 102, 103, 203, 305, 306, 308, 310, 384, 385, 434, 455, 456, 471, 472, 474, 475, 476); at least 5 credits in criticism (SP CMU 222, 270, 329, 375, 424, 425, 426, 428); and at least 5 credits in practice (SP CMU 140, 220, 235, 301, 320, 334, 335, 341, 349, 368, 369, 373, 421, 440, 442, 444, 446, 473). SP CMU 400 and 499 do not count toward the minor. Minimum 10 credits at the 400 level.

Graduate Program

Gerry Philipson, Graduate Program Coordinator

Graduate study is guided by the principle that speech communication is a unified discipline concerned with the ways persons share meanings and how shared meanings affect, and are affected by, persons and society at large. Specialty areas include communication theory; interpersonal, small group, organizational, instructional, cultural/intercultural, and developmental

communication; communication education; oral interpretation; freedom of speech; argument; rhetorical theory; criticism; and public address. Emphasis is on both social scientific and humanistic methods of scholarly inquiry.

The M.A. program with thesis requires at least 31 credits of approved course work and a thesis (9 credits). The M.A. program without thesis: 45 credits, including a creative project.

The Ph.D. program usually requires four years of study beyond the baccalaureate degree.

Special Research Facilities

A laboratory complex accommodates studies on individuals and groups of varying sizes and includes one-way mirrors, as well as audio and video capabilities. A computer lab houses several personal computers, terminals, and printers that are linked to the University's computer systems. An instructional resource center provides support for the development and use of electronic and print materials for teaching and research.

Admission Qualifications

A background of academic work adequate for pursuit of the degree sought is required. Applicants for the Ph.D. are normally expected to have an M.A. in speech communication or communications. A GPA and Graduate Record Examination scores that give promise of success in the department's graduate program are required.

Financial Assistance

The department annually awards a number of teaching assistantships.

Correspondence and Information

Graduate Program Coordinator
205 Raitt, Box 353415

Faculty

Chair

Barbara P. Warnick

Professors

Baskerville, Barnet 1940, (Emeritus); MA, 1944, University of Washington; PhD, 1948, Northwestern University; public address, rhetorical criticism.

Bosmajian, Haig A. * 1965; PhD, 1960, Stanford University; rhetoric, freedom of speech.

Nilsen, Thomas R. 1946, (Emeritus); MA, 1948, University of Washington; PhD, 1953, Northwestern University; contemporary rhetorical theory, ethics of rhetoric.

Phillipsen, Gerry F. * 1978; PhD, 1972, Northwestern University; ethnography of communication.

Scheidel, Thomas M. 1976, (Emeritus); PhD, 1958, University of Washington; communication theory and research, small group processes.

Staton, Ann Q. * 1977; PhD, 1977, University of Texas (Austin); instructional communication.

Stewart, John R. * 1969; PhD, 1970, University of Southern California; philosophy of qualitative research and interpersonal communication.

Warnick, Barbara P. * 1980; PhD, 1977, University of Michigan; rhetorical theory and criticism.

Associate Professors

Parks, Malcolm R. * 1978; PhD, 1976, Michigan State University; communication theory, interpersonal communication, research methods.

Post, Robert M. * 1960; PhD, 1961, Ohio University; oral interpretation of literature.

Assistant Professors

Bauman, Isabelle * 1990; MA, 1990, University of Wisconsin; comprehension conversation and politeness.

Manusov, Valerie L. * 1993; PhD, 1989, University of Southern California; the interplay between communication behaviors and cognitions in interpersonal interactions.

Senior Lecturer

Nyquist, Jody D. 1966; MA, 1967, University of Washington; communication education.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

SP CMU 102 Speech, the Individual, and Society (5) VLPA/I&S Provides a basic understanding of human speech communication. Covers three major areas: (1) the nature of human communication, including models, principles, settings; (2) elements of verbal and nonverbal communication; and (3) approaches to, and functions of, human communication including persuasion, interpersonal communication, argument, propaganda, free speech.

SP CMU 103 Interpersonal Communication (5) VLPA/I&S Emphasizes analyzing and understanding communication variables affecting human relationships, such as person perception, feedback, idea development, nonverbal cues. Focus on informal communication settings.

SP CMU 140 Oral Interpretation of Literature (5) VLPA Analysis and critical study of imaginative literature through the medium of oral performance. Includes verse, prose, and drama.

SP CMU 203 Communication in the Classroom (5) VLPA/I&S Theory and practice of interpersonal communication in instructional settings. Designed to prepare prospective teachers to employ communication effectively as a medium of teaching and learning, to create a classroom communication environment in which interaction is open and productive. Recommended for all teacher candidates in any discipline.

SP CMU 220 Introduction to Public Speaking (5) VLPA/I&S Emphasizes choice and organization of material, sound reasoning, audience analysis, oral style, and delivery. Overview of history of rhetoric. Classroom speeches followed by conferences with instructor.

SP CMU 222 Speech Communication in a Free Society (3) VLPA/I&S Problems and arguments related to freedom of speech; early English writers on freedom of expression; background of freedom of speech in the United States; contemporary freedom of speech issues.

SP CMU 235 Parliamentary Procedure (3) VLPA/I&S Principles and practice: a study of the historical bases and contemporary uses of parliamentary procedure; methods and practice in organizing and conducting public meetings.

SP CMU 270 Introduction to Empirical Research in Speech Communication (5) I&S Basic research principles in speech communication science; survey of substantive research findings. Recommended: any 100- or 200-level speech communication course.

SP CMU 301 Interviewing (5) VLPA/I&S Interviewing principles and practices, with emphasis on information gathering and persuasive interviews. Purposes and types of interviews, structure of interviews, and influence of communication patterns on interview outcomes.

SP CMU 305 Perspectives on Language in Speech Communication (5) VLPA/I&S Study of language and meaning, and survey of several influential modern approaches, including the semantic, general semantic, behavioral, and analytic philosophical. Relates theories of language and meaning to the study of speech communication.

SP CMU 306 Nonverbal Communication (5) VLPA/I&S Reviews the nature of nonverbal communication as part of the human message system. Discusses research on the types of cues that are part of the nonverbal system, reviews some communicative functions allowed by nonverbal cues (e.g., emotional expressions, relational messages, deception, coordination, or interaction), and ties nonverbal communication to language.

SP CMU 308 Humanistic Approaches to Interpersonal Communication (5) VLPA Exploration of several humanistic approaches to interpersonal speech communication, emphasizing the theorists' philosophical orientations.

SP CMU 310 The Rhetorical Tradition in Western Thought (5) VLPA/I&S Analysis of the major theories that prescribe and describe the use of symbols to change attitudes and behavior. Principal emphasis is placed upon defining the nature and scope of rhetoric and upon analyzing the art's underlying assumptions about human beings as symbol users. Some background in history, philosophy, and literature is desirable. Recommended: junior standing.

SP CMU 320 Public Speaking (5) VLPA/I&S Practice in preparation and presentation of a variety of types of public speeches based on study of their structure and form; emphasis on organization and delivery. Recommended: 220.

SP CMU 329 Rhetoric of Social and Political Movements (5) VLPA/I&S Inquiry into the rhetoric of social and political movements; emphasis on investigation of persuasive discourse; examination of the nonverbal symbols of persuasion.

SP CMU 334 Essentials of Argument (5) VLPA/I&S Argument as a technique in the investigation of social problems; evidence, proof, refutation, persuasion; training in argumentative speaking.

SP CMU 335 Methods of Debate (5) VLPA/I&S Debate as a method of advocacy, with emphasis on the analysis of value and policy questions. Prerequisite: 220 or 334.

SP CMU 341 Oral Interpretation of Children's Literature (3) VLPA Study and performance of children's literature, emphasizing oral interpretation as a method of teaching literature in the elementary school.

SP CMU 349 Readers Theatre (2, max. 10) VLPA Preparation and public presentation of programs of literary works. Credit/no credit only. Prerequisites: 140 and permission of instructor.

SP CMU 368 Small-Group Facilitation (3) VLPA/I&S Methods for facilitating discussion in small groups formed for the purposes of instruction. Emphasis is on each student's practical application of the insights derived. Prerequisites: permission of instructor, concurrent registration in 369. Recommended: 102.

SP CMU 369 Small-Group Facilitation Practicum (2) VLPA/I&S Implementation of the theoretical principles taught in 368. Emphasis on direct application of those principles to an assigned group of students from 102. Prerequisite: concurrent registration in 368.

SP CMU 373 Principles of Group Discussion (5) VLPA/I&S Discussion as an everyday community activity, with emphasis on the informal cooperative decision-making methods of committee, conference, and roundtable groups.

SP CMU 375 Ethics in Interpersonal and Public Speech Communication (5) VLPA/I&S Ethical problems in interpersonal and public speech communication. Alternative ways of evaluating and responding to moral problems in a variety of communication situations.

SP CMU 382 Introduction to Communication Research (5) I&S Comprehensive introduction to research methods employed in basic and applied communication research, including sample surveys, content analysis, experimentation, and elementary statistics. Offered: jointly with CMU 382.

SP CMU 384 Cultural Codes in Communication (5) VLPA/I&S Social and cultural codes in interpersonal communication, with special reference to contemporary American subcultural groups and their communication patterns.

SP CMU 385 Fieldwork in Communication Studies (5) Theory and practice of participant observation, intensive interviewing, and discourse analysis in the study of communicative practices.

SP CMU 400 Theoretical Backgrounds in Speech Communication (3) VLPA/I&S Speech viewed as a form of individual and social behavior, with emphasis on the function of symbols in speech communication in informal and societal settings. The development of speech as a field of study and its contemporary emphases.

SP CMU 421 Advanced Speech Composition (5) VLPA/I&S Preparation and delivery of public speeches with emphasis on style, thought organization, and proof. Analysis of model speeches. Recommended: 220 or 320.

SP CMU 424 Rhetorical Perspectives in Intellectual Revolutions (5) VLPA/I&S Rhetorical investigation of selected major writings. Examines the rhetorical dimension in the progress of ideas through analysis of documents of major intellectual revolutions as persuasive works. Relates principal revolutions in Western thought to contemporary controversy. Examines Rights of Man, Communist Manifesto, The Origin of Species.

SP CMU 425 American Public Address (5) VLPA/I&S Historical and critical study of rhetorical discourse and movements and of their relationship to American political, social, and intellectual life. Examines the discourse of the American revolution, debates on the ratification of the federal constitution, the slavery question, Reconstruction, populism, imperialism.

SP CMU 426 American Public Address (5) VLPA/I&S Historical and critical study of rhetorical discourse and movements and of their relationship to American political, social, and intellectual life. Examines Lyceum and Chautauqua movements, progressive era, World War I, the New Deal, isolationism, the Cold War era, civil rights movement, anti-nuclear movement. Recommended: 425.

SP CMU 428 British Public Address (5) VLPA/I&S Historical and critical analysis of significant speeches and speakers and of their relationship to British social, political, and religious life. Historical overview of the major periods of British oratory and of the unique role of the oration in each as a means of exhortation and advocacy.

SP CMU 434 Argumentation Theory (5) VLPA/I&S Theory and research on the structure and properties of argument, argument fields, argument modeling, the influence of audience, argument criticism, and related topics. Prerequisite: 220 or 334.

SP CMU 440 Oral Interpretation of Poetry (3) VLPA Study of forms of verse through analysis and oral presentation. Recommended: 140.

SP CMU 442 Oral Interpretation of Fiction (3) VLPA Analysis and oral interpretation of narrative

perspectives in the novel and the short story. Recommended: 140.

SP CMU 444 Oral Interpretation of Modern Dramatic Literature (3) VLPA Study of dramatic literature from Ibsen to the present for purposes of developing understanding, appreciation, and ability to communicate its meaning. Recommended: 140.

SP CMU 455 Communication in Children's Environments (5) VLPA/I&S Study of the communication capacity of children with emphasis on the analysis of the communication process in formal and informal learning environments. Includes examination of communication-based educational approaches and instructional strategies.

SP CMU 456 Communication in Adolescent Environments (5) VLPA/I&S Study of the communication process in youth environments with a primary focus on formal and informal learning. Includes critical analysis of communication in contemporary instructional settings and the development of communication strategies for teaching and learning.

SP CMU 471 Persuasion (3) VLPA/I&S Analysis of the ways in which beliefs, values, attitudes, and behavior are deliberately influenced through communication. Recommended: junior standing.

SP CMU 472 Empirical Approaches to Interpersonal Communication (5) I&S Examination of major theoretic positions and empirical research findings in current speech communication literature on interpersonal influence. Emphasis on the insights that such theory and research provides on human speech communication behavior in common interpersonal situations. Recommended: junior standing.

SP CMU 473 Problems of Discussion Leadership (3) VLPA/I&S Critical analysis of leadership in committee and conference, with emphasis on the development of speech effectiveness in the cooperative achievement of goals. Recommended: 373.

SP CMU 474 Communication, Conflict, and Cooperation (5) VLPA/I&S Role of communication in resolving informal conflicts and in facilitating interpersonal and intergroup cooperation. Review of empirical literature. In-class simulations and exercises. Prerequisite: 373.

SP CMU 475 Organizational Communication (5) VLPA/I&S Role of communication in organizations, the types of problems arising, and approaches to their resolution. Communication in the human relations and productivity of organizations. Applying communication skills in various organization roles. Recommended: junior standing.

SP CMU 476 Models and Theories in Speech Communication (5) I&S Examination of selected theories and models of speech communication, as well as of criteria applicable to them. Emphasis on the nature and function of theories and models, especially as these relate to basic principles underlying the scientific, interpretive, and critical study of speech communication phenomena. Recommended: junior standing. Offered: jointly with CMU 476.

SP CMU 478 Intercultural Communication (5) I&S Investigates intercultural communication theory and its application for varying levels of human interaction: interpersonal, intergroup, and international. Recommended: SP CMU 384. Offered: jointly with CMU 421.

SP CMU 482 Interpersonal Communication in Virtual Relationships and Communities (5) Examination of relationships and groups formed through computer-mediated interpersonal communication. Focus on how people manage interactions and identities, develop interpersonal relationships, engage in collaboration and conflict, and develop communities in virtual environments. Involves both the study and use of network-based computer-mediated systems.

SP CMU 498 Special Topics in Speech Communication (2-5, max. 15) Lecture, seminar, and/or team study. Topics vary.

SP CMU 499 Undergraduate Research (1-5, max. 10) Prerequisite: permission of instructor.

Courses for Graduates Only

SP CMU 501 Introduction to Graduate Research in Speech Communication (3)

SP CMU 506 Nonverbal Communication Theory and Research (5) Primary theories and research on nonverbal communication. Focus on developmental and social aspects of nonverbal cues, including review of communicative functions served by nonverbal channels. Topics include tie of paralinguistic systems to language, deception, relational messages, acquisition of cue use, and emotional expression. Research methods for studying nonverbal behavior also covered.

SP CMU 510 Rhetoric in Society (4) Selected works of major rhetorical theorists such as Aristotle, Cicero, Augustine, Campbell, Whately, Perelman, and Burke. Examines how rhetorical themes are responsive to and symptomatic of societal conditions and values.

SP CMU 521 Studies in Greek and Roman Rhetoric (5) Development of the Greek tradition in rhetorical theory, criticism, and pedagogy from Homer to Augustine; analysis of the contributions of major figures and works to that tradition.

SP CMU 522 Studies in Medieval Rhetoric (5) Critical analysis of selected persons, works, and topics related to the development of rhetorical theory during the Middle Ages.

SP CMU 523 Studies in Renaissance and Modern Rhetoric (5) Development of rhetorical theory from the mid-sixteenth to early nineteenth centuries. Examines the contributions of Wilson, Ramus, Bacon, Port Royalists, Vico, Campbell, Blair, and Whately.

SP CMU 524 Studies in Contemporary Rhetoric (5) Critical analysis of theories of twentieth-century rhetoric.

SP CMU 525 Rhetorical Criticism (5) History and method of rhetorical criticism. Application of critical standards to various rhetorical artifacts.

SP CMU 526 The Rhetoric of Scientific Revolutions (3) Examines selected topics in the history of science, underscoring the interplay of language, situation, culture, and prior tradition in the quest for exact knowledge of the natural world. Focuses on one science: biology, geology or psychology, examining selected revolutions within that discipline.

SP CMU 530 Philosophical Issues in Rhetorical and Communication Theory (5) Survey of selected philosophical controversies among speech communication theorists, and analysis of one philosopher's approach to communication. Topics include paradigm descriptions of communication, rhetoric and knowledge, linguistic analysis and communication, hermeneutics and dialogue. Prerequisite: graduate standing.

SP CMU 540 History of Oral Interpretation (3) Critical analysis of writings by Sheridan, Walker, Rush, Delsarte, Bell, Curry, Emerson, and others.

SP CMU 550 Instructional Design in Speech Communication (4) Research, theory, and practice relevant to instructional design in speech communication. Instructional models, writing instructional objectives, strategies, and evaluative measures.

SP CMU 555 Instructional Communication (5) Communication in instructional environments. Nature of instructional communication, paradigms for instructional communication research, quantitative and qualitative approaches to instructional communication, verbal and nonverbal classroom interaction.

SP CMU 560 Social Scientific Perspectives on Interpersonal Communication (5) Social scientific research and theory on the role of communication in developing and maintaining interpersonal relationships. Nature of interpersonal communication, relationship change processes, interpersonal control through communication, and personal communication networks.

SP CMU 570 Organizational Communication (5) Examination of social scientific theory and research on communication in organizations. Topics include quantitative and qualitative approaches to process of organizational communication, function and structure of macro networks, superior-subordinate relationships, and the role of communication in organizational change, development, and effectiveness. Prerequisite: graduate standing in the social sciences.

SP CMU 572 Theories of Human Communication (4) Description and evaluation of theoretical approaches to the study of human communication. Exploration of their applications to specific subject areas.

SP CMU 575 Philosophy of Interpretive Research in Communication (5) Introduces interpretive researchers to foundations of this approach in Dilthey, Gadamer, Schutz, Weber, Wittgenstein, and others. Emphasizes Gadamer's philosophical hermeneutics.

SP CMU 576 Research Methods in Speech Communication (5) Application of behavioral research principles to problems in quantification, design, and analysis of data in speech communication research.

SP CMU 577 Research Problems in Speech Communication (3-6, max. 12) Application of methodology and design principles to research problems in speech communication.

SP CMU 581 Advanced Research Methods in Speech Communication (4) Application of social scientific methods to problems in quantification, design, and analysis of communication data. Emphasis on advanced data collection concerns, multivariate data analysis, and computer operation. Prerequisite: 576.

SP CMU 584 Ways of Speaking (5) Theory and literature of the ethnography of communication, with special emphasis on the descriptive-comparative approach to culturally patterned styles of communicative conduct. Offered: jointly with ANTH 584.

SP CMU 588 Small-Group Communication (5) Major small-group theories relevant to communicative behavior. Descriptive and experimental research findings in current speech communication literature. Prerequisite: 473.

SP CMU 590 Seminar in Theory of Speech Communication (3-4, max. 12)

SP CMU 592 Seminar in Public Address (3-4, max. 12)

SP CMU 593 Seminar in Rhetorical Theory (3-4, max. 12)

SP CMU 594 Seminar in Oral Interpretation (2, max. 6)

SP CMU 595 Seminar in Speech Communication Education (3-4, max. 12)

SP CMU 597 Seminar in Interpersonal Communication (3-4, max. 12) Examination of experimental literature on selected topics. Subject changes from year to year; topics include conflict resolution, information processing, communication networks, feedback systems, audience composition research, communication effects.

SP CMU 598 Small-Group Discussion and Communication (3-4, max. 12) Introduction to study of communication within small problem-solving groups. Theoretical as well as methodological dimensions of selected studies. Emphasis on role communication in

decision-making process. From a communication viewpoint, examines such topics as conformity, consensus, interpersonal attraction, and emergent phases of discussion.

SP CMU 800 Independent Study or Research (*)

SP CMU 700 Master's Thesis (*)

SP CMU 800 Doctoral Dissertation (*)

Statistics

B313 Padelford

Probability provides the conceptual foundation and mathematical language for the logic of uncertainty and induction. Statistics is concerned with procedures for the acquisition, management, exploration, and use of information, in order to learn from experience in situations of uncertainty and to make decisions under risk. Statistical practice includes: design of experiments and of sampling surveys; exploration, summarization, and display of observational data; drawing inferences, and assessing their uncertainty; building mathematical models for systems with stochastic components.

By means of joint faculty appointments, courses, and seminars, the Department of Statistics maintains active academic contacts with the School of Business Administration; the College of Engineering; the Departments of Applied Mathematics, Atmospheric Sciences, Cardiology, Economics, Genetics, Geological Sciences, Geophysics, Hematology, Mathematics, Psychology, Radiology, Sociology, and Zoology; the Quantitative Ecology and Resource Management program; the Applied Physics Laboratory; and the Applied Statistics Division of the Boeing Company. The department has an especially close relationship with the Department of Biostatistics.

Undergraduate Program

Bachelor of Science

The Bachelor of Science program offers broad-based, flexible educational pathways emphasizing the theoretical, practical, or computational aspects of probability and statistics. The program serves the needs of future statisticians in science, industry, business, and government, as well as providing the necessary background and stimulation for graduate study; it also offers excellent opportunities for double-majoring in statistics and either mathematics or computer science.

Admission Requirements: (1) Completion of 45 credits, including MATH 124, 125, 126; a minimum 8 credits from one of the following groups of courses: ASTR 101, 102, 190, 201, 301; CHEM 120, 140, 141, 145, 150, 151, 155; GENET 351, 372, 453, 455; PHYS 114, 115, 116, 117, 118, 119, 121/131, 122/132, 123/133, 210, 211, 212; and one course from STAT 220, 301, 311, 390, or an approved substitute; (2) minimum grade of 2.0 in each of the above listed prerequisites and a cumulative GPA of 2.80 for these courses. Students wishing to declare a statistics major must apply by bringing transcripts which include completed prerequisites to B309 Padelford during any quarter.

Major Requirements: MATH 124, 125, 126; 307, 308, 309; 324, 325 (the honors sequences in calculus may replace the corresponding regular sequences); ENGR/CSE 142, CSE 143; one course from STAT 220, 301, 311, 390, or approved substitute; 341, 342, 394, 395 (or substitute approved by statistics adviser), 421, 423. Electives (9 credits): one upper-division course in mathematics, statistics, or computer science, plus two upper-division courses in any discipline (including but not limited to mathematics, statistics, and computer science), all subject to prior approval by the statistics adviser. The first elective gives an opportunity to define the flavor of the major within these interrelated math-

ematical fields, and the other two give a chance to broaden the basis of the major into a special interest area, chosen from the full range of upper-division courses offered at the University. Grades of 2.0 or better in all courses used to satisfy major requirements. Cumulative GPA of 2.50 in required statistics courses.

Minor

Minor Requirements: MATH 124, 125, 126; STAT 311 or approved substitute, 341, 342, 394, 421 (or 423); one elective from the following choices: 395 (strongly recommended), 396, 403, 423, 427, 428, CSE/ENGR 142, MATH 307, 308, AMATH 351, 353. Grades of 2.0 or better in all courses used to satisfy minor requirements.

Graduate Programs

The graduate programs emphasize both the theory and application of statistics, including probability theory, mathematical statistics, data analysis, statistical computing, and scientific applications. An ongoing statistical consulting program provides the students with practical experience in using statistics and in communicating with clients. Under faculty supervision, participants in the program assist members of the University community in applying statistical methodology. The department offers Master of Science and Doctor of Philosophy degrees.

Admission Requirements

Background in mathematics, statistics, or a quantitative field, with 30 or more quarter credits in mathematics and statistics, to include a year of advanced (second year) calculus, one course in linear algebra, and one course in probability theory; Graduate Record Examination scores, including the Advanced Mathematics subject test; three letters of recommendation from appropriate former or current faculty.

Master of Science

Graduation Requirements: At least twelve approved courses numbered 400 or above with a value of 36 credits or more; of these, at least six courses must be numbered in the 500 series (exclusive of 512, 513) with a value of 18 credits or more, and with a coherent theme. Approved proficiency in statistical computing. Satisfactory participation in statistical consulting and the departmental seminar. Passage of an appropriate final master's examination. Successful completion of a master's thesis can count as up to three courses worth 9 credits, but cannot replace any of the six courses in the 500 series mentioned above. All programs must be approved in advance by the departmental graduate program coordinator.

Doctor of Philosophy

Graduation Requirements: Appropriate training in statistics and related sciences. Appropriate General Examination of basic graduate-level knowledge in statistics and probability (including two preliminary examinations). Satisfactory performance in three approved core course sequences chosen from STAT 570, 571, 572; 581, 582, 583; 521, 522, 523; 534, 535, 538; and 516, 517, 565. (In some circumstances, other graduate-level mathematical science courses may be used as a substitute.) Approved performance in statistical consulting (typically STAT 598 and 599). Demonstration of proficiency in computing. 1 credit of STAT 590 per quarter. Demonstration of ability to read technical literature in Chinese, French, German, or Russian. Dissertation. Final Examination.

Computing Facilities

Computing facilities in the Department of Statistics rank among the best of any statistics programs in the country and reflect the department's expertise in the field of statistical computing. For graduate instruction, the department relies primarily on the Mathematical Sciences Computing Center's laboratory of UNIX and Macintosh workstations. For research purposes, the

department has a network of approximately 35 DEC, Macintosh, Sun and Silicon Graphics workstations, and many X-terminals. Support is provided by a systems programmer/administrator.

Financial Aid

The department annually awards a limited number of teaching and research assistantships for the support of new and continuing graduate students on the basis of academic promise.

Correspondence and Information

Undergraduate or Graduate Program Coordinator
Department of Statistics, Box 354322

Faculty

Chair

Werner Stuetzle

Professors

Bass, Richard * 1977, (Adjunct); PhD, 1977, University of California (Berkeley); probability theory.

Besag, Julian E. * 1989; BS, 1963, University of Birmingham (UK); spatial statistics, applications to epidemiology, image analysis, agriculture; Bayesian inference.

Birnbaum, Z. W. * 1939, (Emeritus); PhD, 1929, John Casimir State University (Poland); probability, mathematical statistics (distribution-free statistics, reliability theory).

Burdzy, Krzysztof * 1988, (Adjunct); PhD, 1984, University of California (Berkeley); probability theory.

Felsenstein, Joseph * 1968, (Adjunct); PhD, 1968, University of Chicago; evolution and population genetics.

Fleming, Thomas Richard * 1984; MA, 1974, PhD, 1976, University of Maryland; survival analysis, cancer clinical trials, AIDS research, sequential analysis.

Ford, E. David * 1985, (Adjunct); PhD, 1968, University College, London (UK); forest ecology and ecophysiology, modeling, spatial statistics.

Guttorp, Peter * 1980; PhD, 1980, University of California (Berkeley); point processes, stochastic models, applications to hydrology and atmospheric science.

Kronmal, Richard A. * 1964; PhD, 1964, University of California (Los Angeles); nonparametric density estimation, computer algorithms, cardiovascular data analysis, clinical trials.

Lunneborg, Clifford E. * 1962, (Emeritus); PhD, 1959, University of Washington; psychometrics, multivariate models, individual differences in cognition.

Nelson, Charles R. * 1975, (Adjunct); PhD, 1969, University of Wisconsin; time series analysis, economic statistical analysis, advanced macroeconomic theory.

O'Sullivan, S. Finbarr * 1987; PhD, 1983, University of Wisconsin; nonparametric curve estimation, inverse problems, radiology.

Perlman, Michael D. * 1979; PhD, 1967, Stanford University; multivariate analysis, decision theory, probability inequalities, graphical Markov models.

Raftery, Adrian Elmes * 1985; Doctorate, 1980, University of Paris (France); Bayesian statistics, spatial statistics, clustering, whales, sociology and demography.

Scholz, Friedrich-Wilhelm * 1972, (Affiliate); PhD, 1971, University of California (Berkeley); large sample theory, reliability, risk and tolerance analysis, bootstrap, extreme value theory.

Shorack, Galen * 1965; PhD, 1965, Stanford University; empirical processes, robustness, nonparametric statistics, reliability, large sample theory.

Siegel, Andrew F. * 1983, (Adjunct); PhD, 1977, Stanford University; statistics, computing, corporate finance, investments.

Stuetzle, Werner * 1984; PhD, 1977, Swiss Federal Institute of Technology; nonparametric methods in multivariate analysis, statistical applications of computer graphics.

Thompson, Elizabeth A. * 1985; PhD, 1974, Cambridge University (UK); statistical analysis of human genetic data, statistics of conservation and computational biology.

Wellner, Jon A. * 1983; PhD, 1975, University of Washington; large-sample theory, asymptotic efficiency, empirical processes, semiparametric models.

Associate Professors

Madigan, David * 1990; PhD, 1990, Trinity College (Ireland); graphical models, Bayesian inference, computer-supported learning, information retrieval.

McDonald, John A. * 1985, (Research); PhD, 1982, Stanford University; scientific computing, computer-aided language learning, computer processing of Asian languages.

Percival, Donald B. * 1979, (Affiliate); PhD, 1983, University of Washington; time series and signal analysis, computational environments, statistics of clocks.

Riskin, Eve A. * 1990, (Adjunct); PhD, 1990, Stanford University; image compression and processing, and signal processing.

Sampson, Paul D. * 1981, (Research); PhD, 1979, University of Michigan; spatial statistics and environmental metrics, morphometrics, statistical consulting.

Zeh, Judith * 1961, (Research); PhD, 1979, University of Washington; estimation of whale population size and dynamics, statistics in infectious disease research.

Assistant Professor

Kooperberg, Charles L. * 1991; PhD, 1991, University of California (Berkeley); splines, density estimation, image reconstruction, spatial statistics, function estimation.

Senior Lecturer

Morita, June G. * 1982; PhD, 1985, University of California (Berkeley); survey design/implementation, quality control, survival analysis, statistical data analysis.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

STAT 111 Lectures in Applied Statistics (1) NW Weekly lectures illustrating the importance of statisticians in a variety of fields, including medicine and the biological, physical, and social sciences. Contact instructor for information on emphasized fields of applications. Credit/no credit only. Offered: jointly with BIOS 111; Sp.

STAT 220 Basic Statistics (5) NW, QSR Objectives and pitfalls of statistical studies. Structure of data sets, histograms, means, and standard deviations. Correlation and regression. Probability, binomial and normal. Interpretation of estimates, confidence intervals, and significance tests. (Students may receive credit for only one of 220, 301, 311, and ECON 311.) Prerequisite: 1.5 years of high school algebra. Offered: AWSpS.

STAT 301 Basic Statistics with Applications (5) NW, QSR Objectives, pitfalls of statistical studies. Structure of data sets, histograms, means, standard deviations. Correlation, regression. Probability, binomial and normal. Interpretation of estimates, confi-

dence intervals, significance tests. Application to problems in student's major field. (Students may receive credit for only one of 220, 301, 311, and ECON 311.) Prerequisites: 1.5 years of high school algebra. Offered: W.

STAT 311 Elements of Statistical Methods (5) NW, QSR Elementary concepts of probability and sampling; binomial and normal distributions. Basic concepts of hypothesis testing, estimation, and confidence intervals; t-tests and chi-square tests. Linear regression theory and the analysis of variance. (Students may receive credit for only one of 220, 301, 311, and ECON 311.) Prerequisite: MATH 111 or 120. Offered: AWSpS.

STAT 316 Regression Analysis and Design of Experiments (3) NW Introduction to the analysis of data from planned experiments. Analysis of variance and regression analysis with applications in engineering. Prerequisite: ENGR 315 or permission of instructor. Offered: jointly with IND E 316.

STAT 341, 342 Introduction to Probability and Statistical Inference I, II (4, 4) NW Brief review of: sample spaces, random variable, probability. Distribution: binomial, normal, Poisson, geometric. Followed by: expectation, variance, central limit theorem. Basic concepts of estimation, testing, and confidence intervals. Maximum likelihood estimators and likelihood ratio tests, efficiency. Introduction to regression. Prerequisite: 311, MATH 126, and MATH/STAT 394. Offered: W, Sp.

STAT 361, 362 Statistics for Social Scientists (3, 3) NW Introduction to statistical methodology, measurement scales, design of surveys and experiments, descriptive statistics, exploratory data analysis, probability distributions, use of computer packages for statistical data analysis, point and interval estimation hypothesis testing. Comparisons, two sample tests, nonparametric methods, measuring and testing association, correlation, simple linear and multiple regression, time series, multivariate data analysis, analysis of variance (ANOVA) and analysis and covariance (ANCOVA). Prerequisite: 220 or 311, or equivalent. Computers used, but no prior experience required. Offered: A, W.

STAT 390 Probability and Statistics in Engineering and Science (4) NW Concepts of probability and statistics. Conditional probability, independence, random variables, distribution functions. Descriptive statistics, transformations, sampling errors, confidence intervals, least squares and maximum likelihood. Exploratory data analysis and interactive computing. (Students may receive credit for only one of 390, 481, and ECON 580.) Prerequisites: MATH 307 or 324 and MATH 205 or 308. Offered: jointly with MATH 390; AWSpS.

STAT 394 Probability I (3) NW Sample spaces; basic axioms of probability; combinatorial probability; conditional probability and independence; binomial, Poisson and normal distributions. Prerequisite: MATH 126. Offered: jointly with MATH 394; AWS.

STAT 395 Probability II (3) NW Random variables; expectation and variance; laws of large numbers; normal approximation and other limit theorems; multidimensional distributions and transformations. Recommended: MATH 324 or 325. Prerequisite: 394. Offered: jointly with MATH 395; WSpS.

STAT 396 Probability III (3) NW Characteristic functions and generating functions; recurrent events and renewal theory; random walk. Prerequisite: 395 or 511. Offered: jointly with MATH 396; Sp.

STAT 403 Introduction to Data Analysis (4) NW Philosophy, methods of exploratory data analysis, robustness, statistical graphics. Structure in data sets: groups of numbers, several groups, bivariate, time series, two-way tables. Includes plotting, transformation, outlier identification, regression, smoothing, me-

dian polish. May not be taken for credit if credit received for 503. Prerequisite: 220 or 311 or QMETH 201 or ECON 311. Offered: Sp.

STAT 421 Applied Statistics and Experimental Design (4) NW Computer-aided data analyses using comparisons between batches, analysis of variance and regression. Evaluation of assumptions, data transformation, reliability of statistical measures (jackknife, bootstrap). Fisher-Gosset controversy. Prerequisites: 342, 390, 481, or permission of instructor. Offered: A.

STAT 423 Applied Regression and Analysis of Variance (4) NW Regression analysis. Problems in interpreting regression coefficients. Estimation, including two-stage least squares. Guided regression: building linear models, selecting carriers. Regression residuals. Analysis of variance. Nonparametric regression. Factorial designs, response surface methods. Prerequisites: 342, 390, 421, 481, or grade of 3.0 in 311 plus MATH 126, or permission of instructor. Offered: W.

STAT 425 Introduction to Nonparametric Statistics (3) NW Overview of nonparametric methods, such as rank tests, goodness of fit tests, 2x2 tables, nonparametric estimation. Useful for students with only a statistical methods course background. Prerequisites: 311, BIOST 473, 511, or permission of instructor. Offered: jointly with BIOST 425; when demand is sufficient.

STAT 427 Introduction to Analysis of Categorical Data (4) NW Techniques for analysis of count data. Log-linear models, logistic regression, and analysis of ordered response categories. Illustrations from the behavioral and biological sciences. Computational procedures. Prerequisites: 362, 421, or permission of instructor. Offered: alternate years.

STAT 428 Multivariate Analysis for the Social Sciences (4) NW Multivariate techniques commonly used in the social and behavioral sciences. Linear models for dependence analysis (multivariate regression, MANOVA, and discriminant analysis) and for interdependence analysis (principal components and factor analysis). Techniques applied to social science data using computer statistical packages. Prerequisites: 362, 421, or permission of instructor. Offered: alternate years; 1996; Sp.

STAT 480 Sampling Theory for Biologists (3) NW Simple random sampling, stratified random sampling, ratio estimates, regression estimates, systematic sampling, cluster sampling, sample size determinations, applications in fisheries and forestry. Sampling plant and animal populations, sampling distributions, estimation and statistical treatment of data. Prerequisites: Q SCI 482, 483, or permission of instructor. Offered: jointly with Q SCI 480; even years.

STAT 481 Introduction to Mathematical Statistics (5) NW Probability, generating functions; the delta-method, Jacobians, Bayes theorem; maximum likelihoods, Neyman-Pearson, efficiency, decision theory, regression, correlation, bivariate normal. (Students may receive credit for only one of 390, 481, and ECON 580.) Prerequisites: 311, ECON 311 or equivalent; MATH 124, 125, 126; and a course in linear algebra, which may be taken concurrently. Offered: jointly with ECON 481; A.

STAT 486 Experimental Design (3) NW Topics in analysis of variance and experimental designs; choice of designs, comparison of efficiency, power, sample size, pseudoreplication, factor structure. Prerequisite: Q SCI 483 or equivalent, matrix algebra. Offered: jointly with Q SCI 486.

STAT 491, 492 Introduction to Stochastic Processes (3, 3) NW Random walks, Markov chains, branching processes, Poisson process, point processes, birth and death processes, queueing theory, stationary processes. Prerequisites: 396 for 491; 491 for 492. Offered: jointly with MATH 491, 492; A,W.

STAT 498 Special Topics (1-5, max. 15) NW Reading and lecture course intended for special needs

of students. Prerequisite: permission of instructor. Offered: When demand is sufficient.

STAT 499 Undergraduate Research (1-5, max. 15) Prerequisite: permission of instructor. Offered: A,W,Sp,S.

Courses for Graduates Only

STAT 503 Practical Methods for Data Analysis (4) Basic exploratory data analysis with business examples. Data summaries, multivariate data, time series, multiway tables. Techniques include graphical display, transformation, outlier identification, cluster analysis, smoothing, regression, robustness. Departmental credit allowed for only one of 403 and 503. Prerequisites: B A 500 or QMETH 500 or equivalent or permission of instructor. Offered: jointly with QMETH 503.

STAT 506 Applied Probability Models (4) Overview of probability models, random variables, independence and conditional probability, Markov chains, stationary time series. Prerequisites: some advanced calculus and linear algebra; familiarity with elementary discrete probability models. Offered: jointly with AMATH 506; Sp.

STAT 512, 513 Statistical Inference (4, 4) General theory of statistical inference; estimation and hypothesis testing; multivariate theory; regression, correlation, and analysis of variance. Prerequisites: 395 and 421, 423, or BIOST 512 (concurrent registration permitted for these three) for 512; 512 for 513. Offered: A,W.

STAT 516-517 Stochastic Modeling of Scientific Data (4-4) Markovian and semi-Markovian models, point processes, cluster models, queueing models, likelihood methods, estimating equations. Prerequisites: 511 or 396 for 516; 516 for 517. Offered: A-W.

STAT 519 Time Series Analysis (3) Descriptive techniques. Stationary and nonstationary processes, including ARIMA processes. Estimation of process mean and autocovariance function. Fitting ARIMA models to data. Statistical tests for white noise. Forecasting. State space models and the Kalman filter. Robust time series analysis. Regression analysis with correlated errors. Statistical properties of long memory processes. Prerequisite: 513. Offered: A.

STAT 520 Spectral Analysis of Time Series (4) Estimation of spectral densities for single and multiple time series. Nonparametric estimation of spectral density, cross-spectral density, and coherence for stationary time series, real and complex spectrum techniques. Bispectrum. Digital filtering techniques. Aliasing, prewhitening. Choice of lag windows and data windows. Use of the fast Fourier transform. The parametric autoregressive spectral density estimate for single and multiple stationary time series. Spectral analysis of nonstationary random processes and for randomly sampled processes. Techniques of robust spectral analysis. Prerequisite: one of 342, 390, 481, or permission of instructor. Offered: jointly with E E 520; W.

STAT 521, 522, 523 Advanced Probability (3, 3, 3) Measure theory and integration, independence, laws of large numbers. Fourier analysis of distributions, central limit problem and infinitely divisible laws, conditional expectations, martingales. Prerequisite: MATH 426. Offered: jointly with MATH 521, 522, 523; A, W, Sp.

STAT 524 Design of Medical Studies (3) Emphasis on randomized controlled clinical trials. Bias elimination, controls, treatment assignment and randomization, precision, replication, power and sample size calculations, stratification, and ethics. Suitable for students in biostatistics and other scientific fields. Prerequisites: BIOST 511 or equivalent, and one of 421, 423, BIOST 513 or EPI 512; or permission of instructor. Offered: jointly with BIOST 524; even years.

STAT 529 Sample Survey Techniques (3) Design and implementation of selection and estimation procedures. Emphasis on human populations. Simple, strati-

fied, and cluster sampling; multistage and two-phase procedures; optimal allocation of resources; estimation theory; replicated designs; variance estimation; national samples and census materials. Prerequisites: 421, 423, QMETH 500 or BIOST 511 or equivalent; or permission of instructor. Offered: jointly with BIOST 529.

STAT 530 Wavelets: Data Analysis, Algorithms, and Theory (3) Review of spectral analysis. Theory of continuous and discrete wavelets. Multiresolution analysis. Computation of discrete wavelet transform. Time-scale analysis. Wavelet packets. Statistical properties of wavelet signal extraction and smoothers. Estimation of wavelet variance. Prerequisites: some Fourier theory and linear algebra; 390, 481, or 513; or permission of instructor. Offered: Sp.

STAT 533 Classical Theory of Linear Models (3) Introduction to one-, two-way analysis of variance; randomized blocks; fixed, random effects, multiple comparisons. Statistical distribution theory for quadratic forms of normal variables. Fitting of the general linear model by least squares. Prerequisites: 421 or 423; and 513, BIOST 513, and a course in matrix algebra. Offered: jointly with BIOST 533; Sp.

STAT 534, 535, 538 Statistical Computing (3, 3, 3) Introduction to scientific computing. Includes programming tools, modern programming methodologies, (modularization, object oriented design), design of data structures and algorithms, numerical computing and graphics. Uses C++ for several substantial scientific programming projects. Prerequisite: experience with programming in a high level language. Offered: jointly with BIOST 534, 535, 538; A, W, Sp.

STAT 536 Log-Linear Modeling and Logistic Regression for the Social Sciences (3) Log-linear modeling of multidimensional contingency tables. Logistic regression. Applications to social mobility, educational opportunity, and assortative marriage. Applied and computing focus. Prerequisite: 395 or SOC 425 or permission of instructor. Offered: jointly with SOC 536.

STAT 542 Multivariate Analysis (3) Multivariate normal distribution; partial and multiple correlation; Hotelling's T^2 ; Bartlett's decomposition; various likelihood ratio tests; discriminant analysis; principal components. Prerequisite: 582 or permission of instructor. Offered: alternate years.

STAT 544 Bayesian Statistical Methods (3) Statistical methods based on the idea of a probability distribution over the parameter space. Coherence and utility. Subjective probability. Likelihood principle. Conjugate families. Structure of Bayesian inference. Limit theory for posterior distributions. Sequential experiments. Exchangeability. Bayesian nonparametrics. Empirical Bayes methods. Prerequisite: 513 or permission of instructor. Offered: alternate years.

STAT 565 Inference in Stochastic Processes (3) Methods for statistical inference from dependent observations. Emphasis on one or more of the following: Markov chains in discrete or continuous time; diffusion processes; point processes; asymptotic theory; filtering and smoothing of linear models. Prerequisite: 581 or permission of instructor. Offered: Sp.

STAT 570, 571, 572 Advanced Applied Statistics and Linear Models (3, 3, 3) Generalized linear models, REML in mixed models for randomized blocks, split plots, longitudinal data. Generalized estimating equations, empirical model building, cross validation, recursive partitioning, generalized additive models, projection pursuit. Prerequisites: 513; 533 or 421 and 423, and a course in matrix algebra for 570; 570 for 571; 571 for 572. Offered: jointly with BIOST 570, 571, 572; A, W, Sp.

STAT 573 Statistical Methods for Categorical Data (3) Exact and asymptotic methods for 2x2 contingency tables. Maximum likelihood estimation of logistic regression models for binary response. Examples in epidemiologic and clinical research. Theory and appli-

cations of log-linear models for discrete data. Selected special topics. Prerequisites: 571 and 581; or permission of instructor. Offered: jointly with BIOST 573; alternate years.

STAT 574 Multivariate Statistical Methods (3) Use of multivariate normal sampling theory, linear transformations of random variables, one- and two-sample tests, profile analysis, partial and multiple correlation, multivariate ANOVA and least squares, discriminant analysis, principal components, factor analysis, robustness, and some special topics. Some computer use included. Prerequisite: 570 or permission of instructor. Offered: jointly with BIOST 574; alternate years.

STAT 576 Statistical Methods for Survival Data (3) Statistical methods for censored survival data. Covers parametric and nonparametric methods, Kaplan-Meier survival curve estimator, comparison of survival curves, log-rank test, regression models including the Cox proportional hazards model, competing risks. Prerequisites: 581 and either 423, BIOST 513, or Q SCI 483, or equivalent. Offered: jointly with BIOST 576; alternate years.

STAT 577 Advanced Design and Analysis of Experiments (3) Concepts important in experimental design: randomization, blocking, confounding. Application and analysis of data from randomized blocks designs, Latin and Greco-Latin squares, incomplete blocks designs, split-plot and repeated measures, factorial and fractional replicates, response surface experiments. Prerequisite: 570 or 421 (minimum grade B-), or permission of instructor. Offered: jointly with BIOST 577.

STAT 578 Special Topics in Advanced Biostatistics (* max. 3) Advanced-level topics in biostatistics offered by regular and visiting faculty members. Prerequisite: permission of instructor. Offered: jointly with BIOST 578.

STAT 579 Advanced Data Analysis (4) Resampling methods; jackknife, bootstrap, cross-validation. Smoothing techniques; local averages; projection-pursuit regression; recursive partitioning regression. Selected aspects of linear regression. Robust-resistant methods. Density estimation. Clustering techniques. The EM-algorithm. Graphical exploratory methods. Prim-B1. Prerequisites: 513; one of 571, 421, 423; or permission of instructor. Offered: jointly with BIOST 579.

STAT 581, 582, 583 Advanced Theory of Statistical Inference (3, 3, 3) Limit theorems, asymptotic methods, asymptotic efficiency and efficiency bounds for estimation, maximum likelihood estimation, Bayes methods, asymptotics via derivatives of functionals, sample-based estimates of variability: (bootstrap and jackknife); robustness; estimation for dependent data, nonparametric estimation and testing. Prerequisites: 513 and MATH 426 and 427 for 581; 581 for 582; 582 for 583. Offered: A, W, Sp.

STAT 586 Martingales: Survival Analysis (3) Fleming Theory of counting processes and martingales to provide unified study of survival analysis methods. Focus on survival distribution estimators, censored data rank statistics, regression methods with censored survival data. Development of small samples moments, asymptotic distributions, and efficiencies. Prerequisite: STAT 520 or equivalent. Recommended: 576. Offered: jointly with BIOST 586; W.

STAT 590 Statistics Seminar (* max. 15) Prerequisite: permission of graduate program coordinator. Credit/no credit only. Offered: AWSp.

STAT 591, 592, 593 Special Topics in Statistics (1-5, max. 15; 1-5, max. 15; 1-5, max. 15) Distribution-free inference, game and decision theory, advanced theory of estimation (including sequential estimation), robustness, advanced probability theory, stochastic processes or empirical processes. Prerequisite: permission of instructor. Offered: A, W, Sp.

STAT 598 Techniques of Statistical Consulting (3) Instruction and practice in planning studies, analyzing data, writing reports, and interacting with clients. Includes applied statistics and consulting literature not covered elsewhere in graduate curriculum. Significant data analysis projects and critiques of actual consulting sessions. Prerequisites: two or more courses in the application of statistical methods. Offered: Asp.

STAT 599 Statistical Consulting (* max. 12) Consulting experience in data analysis, applied statistics. Student required to provide consulting services to students and faculty three hours per week. Credit/no credit only. Prerequisite: permission of graduate program coordinator. Offered: AWSp.

STAT 600 Independent Study or Research (*) Prerequisite: permission of graduate program coordinator. Offered: AWSp.

STAT 700 Master's Thesis (*) Prerequisite: permission of graduate program coordinator. Offered: AWSp.

STAT 800 Doctoral Dissertation (*) Prerequisite: permission of graduate program coordinator. Offered: AWSp.

Women Studies

B110 Padelford

Women Studies is an interdisciplinary department that offers students the opportunity for critical and theoretical study of gender across national contexts. Students select a variety of courses offering breadth in women studies scholarship while pursuing concentrated study in a particular track, such as women and the arts; gender, race, and ethnicity; women and health; and women and the law.

Undergraduate Program

Bachelor of Arts

Major Requirements: WOMEN 200 or equivalent; 5 additional lower-division credits in women studies (excluding 290); one course dealing with race and ethnicity (either WOMEN 322 or 456); all of the following five courses: 455, 491, 492, 493, 497; 15 additional upper-division credits in women studies (excluding 495, 497, 499), which may include a maximum of 5 credits of 490. Also required: 25 additional upper-division credits which may be satisfied by one of two core option sequences: (1) 25 credits in a women studies track (one of several approved series of interdisciplinary courses); (2) 25 credits in an individual course of study arranged between the student and a women studies adviser, with approval of the director.

Minor

Minor Requirements: 30 credits to include WOMEN 200; 5 additional lower-division credits in women studies (205, 206, 250, 257, or 283); one women studies course dealing with race and ethnicity (322 or 456); 15 additional upper-division credits in women studies (excluding 495, 497, 499, but including up to 5 credits of 490). Options also include ENGL 367 and 368.

Faculty

Chair

Shirley J. Yee

Professors

Allen, David G. * 1988, (Adjunct); PhD, 1975, University of Iowa; philosophy of science, critical and feminist theory, psychosocial nursing theory.

Bereano, Philip L. * 1975, (Adjunct); JD, 1965, Columbia University; MPP, 1971, Cornell University; technology assessment, social values, public policy technology; social values, citizen participation.

Blake, Kathleen * 1971, (Adjunct); PhD, 1971, University of California (San Diego); Victorian literature, children's literature, women's studies.

Boersma, P. Dee * 1974, (Adjunct); PhD, 1974, Ohio State University; population, ecology.

Butler, Johnella E. * 1987, (Adjunct); EdD, 1979, University of Massachusetts.

Cauce, Ana Mari * 1986, (Adjunct); PhD, 1984, Yale University; social support and networks, at-risk adolescents, community psychology, minority populations.

Goldsmith, Layne * 1983, (Adjunct); MA, 1975, San Jose State College; MFA, 1979, Cranbrook Academy of Art; fiber arts and related historic and contemporary textile structures and processes.

Gorbman, Claudia L. * 1990, (Adjunct); PhD, 1978, University of Washington; film studies—history, theory, criticism; film sound and music.

Gordon, Margaret T. * 1988, (Adjunct); PhD, 1972, Northwestern University; news media and public policy; violence against women.

Howard, Judith A. * 1982, (Adjunct); PhD, 1982, University of Wisconsin; social psychology, gender roles.

Jeffords, Susan E. * 1985; MA, 1977, PhD, 1981, University of Pennsylvania; feminist theory, American popular culture, and the representation of Vietnam.

Kaplan, Sydney J. * 1971, (Adjunct); PhD, 1971, University of California (Los Angeles); twentieth-century literature, women writers, feminist criticism.

McElroy, Colleen W. * 1972, (Adjunct); PhD, 1973, University of Washington; Black literature, women writers, poetry writing.

Richey, Cheryl A. * 1973, (Adjunct); DSW, 1974, University of California (Berkeley); cultural and gender issues, intervention design and research.

Schwartz, Pepper J. * 1972, (Adjunct); PhD, 1974, Yale University; family, gender, human sexuality, field methods.

Silberstein, Sandra V. * 1982, (Adjunct); PhD, 1982, University of Michigan; TESL, critical theory, discourse analysis, sociolinguistics, language and culture.

Steele, Cynthia * 1986, (Adjunct); PhD, 1980, University of California (San Diego); Latin American literature and society, narrative and feminist theory.

Treat, John W. * 1983, (Adjunct); PhD, 1982, Yale University; Japanese language and literature.

Woods, Nancy * 1978, (Adjunct); PhD, 1978, University of North Carolina; women's health.

Associate Professors

Allen, Carolyn * 1972, (Adjunct); MA, 1966, Claremont Graduate School; PhD, 1972, University of Minnesota; twentieth-century literature, women writers, contemporary critical theory.

Anagnost, Ann S. * 1990, (Adjunct); PhD, 1985, University of Michigan; ethnography of the state, ideology, and popular culture, peasant society; China.

Baldasty, Gerald J. * 1974, (Adjunct); MA, 1974, University of Wisconsin; PhD, 1978, University of Washington; communications history and law, government press relations, First Amendment philosophy and theory.

Barlow, Tani E. 1994; MA, 1979, PhD, 1985, University of California (Davis); gender politics, modernity, women in China.

Clatterbaugh, Kenneth C. * 1966, (Adjunct); PhD, 1966, Indiana University; philosophy of science, modern philosophy, social philosophy.

Cummings, Katherine * 1985, (Adjunct); PhD, 1985, University of Wisconsin; feminist, psychoanalytical,

and literary theory, modern and contemporary literature.

Di Stefano, Christine * 1985, (Adjunct); PhD, 1984, University of Massachusetts; political theory (modern and contemporary), feminist theory, political culture.

Dubrow, Gail Lee * 1989, (Adjunct); MA, 1979, University of Oregon; PhD, 1991, University of California (Los Angeles).

Glenn, Susan A. * 1993, (Adjunct); PhD, 1983, University of California (Berkeley); twentieth-century U.S. social history including women's history, immigration, labor, popular culture.

Hartsock, Nancy C. M. * 1984, (Adjunct); PhD, 1972, University of Chicago; feminist theory, Marxism, contemporary political theory.

Heuving, Jeanne D. * 1990, (Adjunct); PhD, 1988, University of Washington.

Ivy, Marilyn J. * 1992, (Adjunct); PhD, 1988, Cornell University; contemporary critical theory, anthropology of modernity, Japanese culture, politics and history.

Jacobs, Sue-Ellen * 1974; PhD, 1970, University of Colorado (Boulder); anthropological studies of women, applied anthropology, ethnohistory, Native North America.

Kenney, Nancy J. * 1976; PhD, 1974, University of Virginia; neural and endocrine controls of food and fluid intake, physiological basis of motivation.

Lawson, Victoria A. * 1986, (Adjunct); PhD, 1986, Ohio State University; Latin America, political economy of development, feminist theory in development.

Magyary, Diane L. * 1981, (Adjunct); PhD, 1981, University of Washington; family centered health care of children at risk, disabled or handicapped.

Rhodes, Loma A. * 1983, (Adjunct); PhD, 1973, Cornell University; medical anthropology, symbolic anthropology, South Asia, religion, psychiatry.

Roberts, Jean Valerie * 1991, (Adjunct); PhD, 1982, University of Pittsburgh; ancient Greek philosophy, history of ethics and political theory, feminist philosophy.

Salas, Elizabeth 1987, (Adjunct); MA, 1977, California State University, Los Angeles; PhD, 1987, University of California (Los Angeles); United States women's history, Chicano history.

Sears, Laurie J. * 1989, (Adjunct); PhD, 1986, University of Wisconsin; Southeast Asian social and cultural history.

Sokoloff, Naomi B. * 1985, (Adjunct); PhD, 1980, Princeton University; Hebrew language and literature.

Stacey, Robin C. * 1988, (Adjunct); PhD, 1986, Yale University; early and high medieval history, tribal law, Celtic/Anglo-Saxon literature, heresy.

Ward, Deborah * 1987, (Adjunct); PhD, 1987, Boston University; health policy and politics, women's paid and unpaid caregiving work.

Yee, Shirley J. * 1988; PhD, 1987, Ohio State University; U.S. women's history, African-American history, nineteenth-century U.S. social history.

Assistant Professors

Brines, Julie E. * 1993, (Adjunct); PhD, 1990, Harvard University; gender, stratification, family, methods.

Bryant-Bertall, Sarah * 1990, (Adjunct); PhD, 1986, University of Minnesota; dramatic criticism, semiotics, feminist theatre.

Cabeen, Louise * 1993, (Adjunct); MFA, 1989, Chicago, School of Art Institute; socially critical art with research specialties in textile history and techniques.

DuBois, Thomas A. * 1990, (Adjunct); PhD, 1990, University of Pennsylvania; Nordic and North American folkloristics, Finnish, Sami, women's culture, adolescence.

Eliason, Leslie Carol * 1988, (Adjunct); MA, 1985, PhD, 1988, Stanford University; comparative politics, European public policy, comparative education and health care policy.

Friaz, Guadalupe M. 1989, (Adjunct); PhD, 1989, University of California (Berkeley).

Friedman-Kasaba, Kathie * 1987, (Adjunct); MA, 1979, State University of New York (Binghamton); sociology of gender, immigration, race, and ethnicity in the U.S.

Gavel-Adams, Ann-Charlotte * 1986, (Adjunct); PhD, 1990, University of Washington; August Strindberg, Scandinavian women's literature, Scandinavian turn-of-the-century drama and art.

Ginorio, Angela B. * 1981; PhD, 1979, Fordham University; women and science, violence against women, sexual harassment, racial identity among Latinas.

Henderson, Dorothy J. 1994, (Adjunct); MS, 1991, PhD, 1994, University of Michigan; substance abuse, women's health, feminist and critical theories, participatory action research.

Jarosz, Lucy A. * 1990, (Adjunct); PhD, 1990, University of California (Berkeley); political economy of development, food and agriculture, feminist geography, political ecology, Africa.

Klawitter, Marleka * 1990, (Adjunct); MS, 1986, University of Wisconsin; family and employment policy, health economics, women's studies.

Lye, Diane Noreen * 1988, (Adjunct); PhD, 1989, University of Pennsylvania; patterns of family change in developed countries.

Mitchell, Katharyne 1993, (Adjunct); PhD, 1993, University of California (Berkeley); urban, cultural and economic geography, Pacific Rim.

Moody, Jocelyn K. 1991, (Adjunct); MA, 1980, University of Wisconsin; PhD, 1993, University of Kansas; nineteenth-century American, African-American, and women's literature, autobiography.

Neuhouser, Kevin L. * 1990, (Adjunct); PhD, 1990, Indiana University; political economy of developing nations (especially Latin America), gender.

Noble, Kathleen D. 1984, (Research); PhD, 1984, University of Washington; talent development in women and girls; psychology of giftedness; psychology and spirituality.

Schroeder, Carole A. 1993, (Adjunct); MSN, 1985, University of Nevada; PhD, 1993, University of Colorado (Denver); women's health, community health, models of care delivery, health care systems.

Stecher Hansen, Marianne T. * 1988, (Adjunct); MA, 1981, University of Washington; PhD, 1990, University of California (Berkeley); Danish language and literature, Scandinavian novel, Isak Dinesen (Karen Blixen), H.C. Anderson.

Stygall, Gail * 1990, (Adjunct); PhD, 1989, Indiana University; rhetoric and composition, English language linguistics, law and literature.

Sugano, Marian Z. * 1987, (Adjunct); PhD, 1987, University of California (Berkeley); nineteenth- and twentieth-century French literature.

Sunindyo, Saraswati 1993; PhD, 1993, University of Wisconsin; political economy, sociology of gender, popular culture, nationalism.

Twine, Frances Winddance 1994; MA, 1990, PhD, 1994, University of California (Berkeley); racism/antiracism, multiracial/transracial identities, critical theory, Brazil, Britain and U.S.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

WOMEN 200 Introduction to Women Studies (5) I&S *Twine* Feminist analysis of the construction and enforcement of gender differences and gender inequalities in various contexts. Emphasis on the intersection of race, class, sexuality, and nationality in the lives of women. Topics include feminist theory, motherhood, popular culture, sexual autonomy, racism, and activism in the United States, Asia, Latin America. Offered: AWS.

WOMEN 205 Introduction to Global Perspectives on Women (5) I&S *Sunindyo* Introduction to basic concepts of gender, race-ethnicity, class, nation, and sexuality. Topics include international women's histories, comparative women's movements, activism and resistance, feminists' perspectives of global politics and economy, issues of violence, and consideration of women and human rights.

WOMEN 206 Philosophy of Feminism (5) I&S Philosophical analysis of the concepts and assumptions central to feminism. Theoretical positions within the feminist movement; view of the ideal society, goals and strategies of the movement, intersections of the sex-gender system with other systems of oppression. Offered: jointly with PHIL 206/POL S 212.

WOMEN 250 Gender, War, and Peace (5) I&S *Jeffords* Examines extent to which issues of war and peace can be understood through gender. Discussion of long-accepted traditions that men go to war and women do not, that women are more inclined toward peace, that women need to be protected, that men are naturally aggressive or combative.

WOMEN 257 Psychology of Gender (5) I&S *Kenney* Major psychological theories of sex-role development; biological and environmental influences that determine and maintain sex differences in behavior; sex roles in children, sex differences in aggression, cognitive abilities, achievement motivation, affiliation, sexuality. Not open for credit to students who have taken GIS 244. Recommended: PSYCH 101 or 102. Offered: jointly with PSYCH 257; A.

WOMEN 283 Introduction to Women's History (5) I&S *Yee* Includes units on American, European, and Third World women that examine centers of women's activities, women's place in male-dominated spheres (politics), women's impact on culture (health, arts), and the effect of larger changes on women's lives (technology, colonization). Offered: jointly with HIST 283; A.

WOMEN 290 Special Topics in Women Studies (2-5, max. 15) I&S Offered occasionally by visitors or resident faculty.

WOMEN 302 Research Methods in Women Studies (5) I&S *Yee* Explores appropriate research methodologies for interdisciplinary work in women studies. Examines current debates and issues in feminist methodologies and critiques of methodology. Use of historical documents and theoretical texts. Computer applications in research in women studies. Prerequisites: 200, 206, or permission of instructor.

WOMEN 310 Women and the Law (5) I&S Examines how law addresses women, how the courts have made attempts to address women of color, poor women, lesbians, and women with disabilities. Topics include constitutional construction of equality, employment discrimination, reproductive rights, regulation of sexuality, families and motherhood, sexual harassment, violence against women and international women and human rights.

WOMEN 313 Women in Politics (5) I&S Theoretical, historical, and empirical studies of women's participation in political and social movements. Women's diverse efforts to improve their political, social, and economic status. Policy issues of particular concern to women. Women's political experiences in household, local, regional, national, and international arenas Offered: jointly with POL S 313.

WOMEN 321 History of Afro-American Women and the Feminist Movement (5) I&S "Feminist Movement" from early nineteenth century to present. Treats relationship between Black and White women in their struggle for independence, at times together and at times apart. Discusses the reasons, process, and results of collaboration as well as opposition. Examines recent and contemporary attempts at cooperation. Offered: jointly with AFRAM 321.

WOMEN 322 Race, Class, and Gender (5) I&S *Sunindyo* The intersection of race, class, and gender in the lives of women of color in the United States from historical and contemporary perspectives. Topics include racism, classism, sexism, activism, sexuality, and inter-racial dynamics between women of color groups. Offered: jointly with AES 322; A.

WOMEN 323 African-American Women's History (5) I&S *Yee* Survey of African-American women's experience in United States, 1600 to present. Includes: social, political, economic status of Afro-American women in slavery, freedom, education, activism, Civil Rights, women's rights, other social movements. Explores individual and collective interactions with African-American men, white men and women, other people of color. Offered: jointly with AFRAM 323.

WOMEN 339 Women Writers in English Translation (3) VLPA Feminist analysis of selected contemporary texts in English or English translation by Chicana/Latina writers in the United States; or by Spanish-American, Luso-Brazilian and/or Spanish women writers, in their specific socio-historical context. Offered: jointly with SPAN 339.

WOMEN 351 Women of the African Diaspora (5) I&S *Twine* Cross-cultural comparative analysis of African descent women in an international context. Topics include racism, post-colonialism, immigration, occupational segregation, transnational identities, and media representations. Prerequisites: 200 and 205. Offered: jointly with ANTH 351.

WOMEN 353 Anthropological Studies of Women (5) I&S *Jacobs* Cross-cultural and comparative survey of the varieties of women's cultural experiences, statuses, and roles in cultural context and the anthropological theories used to account for them. Topics include: biological factors, studies of primates, woman the gatherer, work in preindustrial and industrial societies, patriarchy and matrilineal kinship, childbirth, and women's roles in economic development. Prerequisites: 200 and ANTH 202 or permission of instructor. Offered: jointly with ANTH 353; W.

WOMEN 354 Lesbian Lives and Culture (5) I&S An exploration and overview of lesbianism in historical, social, cultural, and interpersonal contexts. Prerequisites: 200 or 206 or permission of instructor.

WOMEN 355 Men and Masculinity (5) I&S *Clatterbaugh* Critical study of systematic responses of men to feminist movements, including conservative, pro-feminist, men's rights, mythopoetic, and religious responses. How men of color and gay men view these various men's movements and their issues. Special attention given to philosophical problems such as nature of oppression, human nature, justice, and masculinity.

WOMEN 357 Psychobiology of Women (5) NW *Kennedy* Physiological and psychological aspects of women's lives: determinants of biological sex; physiological and psychological events of puberty, menstruation, and menopause; sexuality; pregnancy, childbirth; the role of culture in determining the psychological response to the physiological events. Prerequisite: 200 or 257 or PSYCH 101 or 102 or 257. Offered: jointly with PSYCH 357; WS.

WOMEN 374 Methods in Life History Research (5) I&S *Jacobs* Techniques and procedures for constructing life histories: use of diaries, letters, photography, and personal interviews. Technical instruction in

use of tape recorder; indexing, cataloging, and writing summaries of tapes; use of cameras for copying documents and photography. Each student completes one life history per quarter. Prerequisite: 200. Offered: Sp.

WOMEN 383 Social History of American Women (5) I&S *Yee* Multi-racial, multi-cultural study of United States women, sixteenth century to present: emphasis on women's unpaid work; participation in paid labor force; charitable, reform activities; feminist movements of the nineteenth and twentieth centuries. Use of primary materials, i.e., diaries, letters, speeches, artifacts. Prerequisite: 200 or 283 or HSTAA 201 or permission of instructor. Offered: jointly with HSTAA 373; W.

WOMEN 392 Asian American Women (5) I&S History of and contemporary issues related to Asian American women in the United States. Prerequisite: AAS 205 or 206. Offered: jointly with AAS 392.

WOMEN 400 Senior Seminar in Women Studies (5) I&S Special topics seminar in women studies. Open to senior majors, students in women studies honors program, or by permission of instructor.

WOMEN 405 Comparative Women's Movements and Activism (5) Sunindyo Comparative cultural, national, and historical study of women's movements and activism. Critically analyzes multiple arenas of women's movements and resistance. Topics include feminist anti-racism, pre-nationalism and nationalism, economics, electoral politics, women's and human rights, and international/transnational feminisms. Prerequisites: 205 or SOC 364 or permission of instructor. Offered: jointly with SOC 405.

WOMEN 410 Feminist Legal Studies: Theory and Practice (5) I&S Examines feminist theoretical analyses of the law. Engages in current debate on the study of critical race, gender, and class theory. Includes: women in prison, public assistance, the sex industry, women and health care, and immigration law. Prerequisites: 200, one upper division women studies course, or permission of instructor. Offered: jointly with POL S 466/SO JU 410.

WOMEN 415 Gender Equity in Education (5) I&S Gender bias, discrimination, and gender equity efforts in K-12 and higher education. Includes curriculum, instructional materials, testing, counseling, teaching, athletics, teacher education, educational employment issues, and sexual harassment. Relevant federal and state laws, court decisions, and strategies for promoting gender equity in education also addressed. Recommended: 200 or SOC 110.

WOMEN 416 Sexist Language and Education (3) I&S How language reflects or determines sexist attitudes, particularly in current educational institutions. Includes male and female language use, systematic lexical syntactic distinctions based on sex, derogatory references to women, influences of classroom language on sex roles, and effects of language of sex differences on learning. Prerequisite: 200 or 15 credits in education or Women Studies.

WOMEN 427 Women and Violence (5) I&S *Ginorio* Multi-disciplinary explorations of the continuum of violence which affects women's lives, ranging from experience in personal settings to cultural or state policies. Violence against women explored in the context of societal, political, and state violence. Prerequisite: 200 or permission of instructor.

WOMEN 429 Scandinavian Women Writers in English Translation (5) VLPA Selected works by major Scandinavian women writers from mid-nineteenth-century bourgeois realism to the present. Offered: jointly with SCAND 427.

WOMEN 439 Women Writers (5) VLPA Feminist analysis of selected texts by Chicana/Latina writers in the United States as well as by Spanish-American, Luso-Brazilian and/or Spanish women writers in their

specific socio-historical contexts. Prerequisites: SPAN 303, SPAN 320, and one additional 300-level course beyond 303. Offered: jointly with SPAN 439.

WOMEN 447 Economics of Gender (5) I&S Microeconomic analysis of the sources of gender differences in earnings, labor force participation, occupational choice, education, and consumption. Economic theories of discrimination, human capital, fertility and intrahousehold resource allocation. Economics of the family in developed and developing countries. Prerequisite: ECON 300 or permission of instructor. Offered: jointly with ECON 447.

WOMEN 454 Women, Words, Music, and Change (5) VLPA/I&S *Jacobs* Comparative analysis of use of myths, tales, music, and other forms of expressive culture to account for, reinforce, and change women's status and roles; cross-cultural analysis of planned change and development. Prerequisite: 353 or permission of instructor. Offered: jointly with ANTH 454.

WOMEN 455 Contemporary Feminist Theory (5) I&S *Barlow* Raises the question of how political contexts condition the way some ideas become theory. Emphasizes the present crises in thinking about a transnational feminism.

WOMEN 456 Feminism, Racism, and Anti-Racism (5) I&S *Twine* Examines meaning of racism and feminism in women's lives in an international context. Building upon an analysis of racial hierarchies and institutionalized racism, explores strategies used by women engaged in feminist and anti-racist activism. Prerequisites: 200 and any 300-level Women Studies course or permission of instructor.

WOMEN 458 Ideologies and Technologies of Motherhood (5) I&S Examines how motherhood is culturally constituted, regulated, and managed within various ideological and technological milieus. Uses ethnographies from anthropology and case studies from feminist legal theory. Topics include slave mothers, surrogate mothers, lesbian mothers, transracial mothers, co-mothers, teen mothers. Prerequisites: 200 and any 300-level WOMEN course. Offered: jointly with ANTH 458.

WOMEN 462 Isak Dinesen and Karen Blixen (5) VLPA The fiction of Isak Dinesen (pseudonym for Karen Blixen) reevaluated in light of current issues in literary criticism, particularly feminist criticism. Close readings of selected tales, essays, and criticism. Offered: jointly with SCAND 462.

WOMEN 464 Chicana Expressive Culture (5) VLPA/I&S Expressive culture of Mexican women in United States. Cultural and artistic practices in home, film, literary (print, oral), performing and visual arts. Focuses on ways Chicana visual artists re-vision traditional iconography. Prerequisites: SPAN 303, 322, one additional 300-level course beyond 303 or permission of instructor. Offered: jointly with CHSTU 464/SPAN 464.

WOMEN 467 Spanish Women (5) VLPA/I&S Women's culture in Spain, focusing on women's experience during Civil War; persecution and censorship of women activists, artists, intellectuals during Franco years; changes in women's culture brought about by reintroduction of democracy; major issues addressed by contemporary Spanish feminists. Prerequisites: SPAN 303, SPAN 321, and one additional 300-level course beyond 303. Offered: jointly with SPAN 467.

WOMEN 468 Latin American Women (5) VLPA/I&S Issues in women's culture from various Latin American countries, social classes, ethnic groups. Includes female creativity, relationship between female artists and the male tradition, women's exploitation of women, relationship of middle-class to popular feminism, connections between feminism and social change. Prerequisites: SPAN 303, SPAN 321, and one additional 300-level course beyond 303. Offered: jointly with SPAN 468.

WOMEN 488 Women and Science (5) I&S *Glinorio* Issues faced by women in science. Points of tension and connection between women and science. Voices of women scientists heard in context of their own experiences. Feminist critiques of science. Impact of science and technology on all women examined with particular attention to reproduction (of knowledge as well as individuals). Prerequisite: one women studies course and one college level science course or permission of instructor.

WOMEN 489 Ethnicity, Gender, and Media (5) I&S *Baldasty* Media portrayal of women and people of color; creation of alternative media systems by women and people of color in the United States. Offered: jointly with CMU/AES 489.

WOMEN 490 Special Topics in Women Studies (2-5, max. 15) I&S Exploration of specific problems and issues relevant to the study of women. Offered by visiting or resident faculty members. Primarily for upper-division and graduate students.

WOMEN 491 Senior Thesis I (3) I&S Introductory course of the senior thesis sequence required of all majors. Students attend a weekly seminar, select a thesis topic, and contract with an appropriate faculty adviser. Successful completion of the course is contingent on submission of an acceptable thesis proposal. Majors and senior standing only.

WOMEN 492 Senior Thesis II (3) I&S Second course in senior thesis sequence required of majors. Majors and seniors only. Prerequisite: 491.

WOMEN 493 Senior Thesis III (5) I&S Third quarter of thesis project. Research and writing of senior thesis under supervision of faculty adviser. Required of all majors. Prerequisite: 491, 492.

WOMEN 495 Tutoring Women Studies (5) Students train to serve as tutors in designated courses. Facilitate weekly group discussions, assist with writing assignments, explain course materials. Credit/no credit only. Prerequisites: 200 or 206, junior or senior standing, one upper-division course relevant to Women Studies, completion of course equivalent to course tutored, and permission of instructor.

WOMEN 497 Fieldwork in Women Studies (3-15, max. 15) Internships in local agencies. Allows development of specific skills in area of specialization. Credit/no credit only. Offered: AWSpS.

WOMEN 499 Undergraduate Research (1-5, max. 10) Independent study and research supervised by a faculty member with appropriate academic interest. Prerequisite: permission of instructor and adviser. Offered: AWSpS.

Courses for Graduate Students Only

WOMEN 501 Cross Disciplinary Feminist Theory (5) *Barlow* Raises questions about how feminism becomes theory and what the relation of feminist theory is to conventional disciplines. Readings exemplify current crises in feminism (e.g. the emergence of neo-materialism; critical race theory; citizenship; identity; transnational and migrancy and questions of post-colonialism) to consider disciplinization.

WOMEN 502 Feminist Research and Methods of Inquiry (5) Explores appropriate research methodologies for interdisciplinary work. Asks how scholarship is related to feminism as a social movement and to the institutions in which we work. Focuses on how similar objects of study are constituted in different disciplines for feminist scholars. Offered: Sp.

WOMEN 512 Critical Interdisciplinary Approaches to Women's Health (3) Critical examination of the historical, socio-political, and scientific influences on women's health. Issues of sexism, racism, and heterosexism discussed from the perspective of different disciplines. Offered: jointly with NURS 512; W.

WOMEN 553 Discourses in Feminist Anthropology Seminar (5) *Jacobs* Exploration of feminist anthropological theories and the works of their critics. Ways of using feminist anthropology in preparation for and conducting fieldwork. Topics include foundations in feminist anthropology, grand theories, variation in feminist theoretical foci within the "four fields," responses to critics. Prerequisite: graduate standing. Offered: jointly with ANTH 555; W.

Zoology

106 Kincaid

Zoology is a natural science concerned primarily with animals: their development, structure, and function, and their relationship with their environments.

Zoology field courses are offered both at the main campus and at the Friday Harbor Laboratories. See individual course listing for location.

Undergraduate Program

Advisers

Joyce Fagel
Peg Powell
Clay Schwenn
318 Hitchcock

The department offers two degree programs: Bachelor of Science, designed for students planning graduate work, and Bachelor of Arts, a program with fewer requirements.

Bachelor of Science

Major Requirements: A minimum of 90 credits distributed as follows: (1) *Supporting course work (minimum of 38 credits):* (a) Chemistry (20 credits): Option 1: CHEM 120, 220, 221, 250 or Option 2: CHEM 140, 150, 160, and 223, 224 (or 237, 238, 239); (b) Physics (8 to 10 credits): PHYS 114 or 121/131, and 115 or 122/132; (c) Mathematics (10 credits): MATH 124, 125 or Q SCI 291, 292 or Q SCI 482, 483. Students who choose calculus for their mathematics requirement are encouraged to take a statistics course such as STAT 311 or Q SCI 381. (2) *Introductory Biology (15 credits):* BIOL 201, 202, 203 or BIOL 101, 102 (with a minimum grade of 2.5 in each), GENET 371; (3) *37 upper-division biological science credits to include:* (a) *Zoology Core:* a minimum of 25 credits including at least two lecture courses from each of three groups and at least one course with a laboratory component from two groups: Group I. Cell Biology, Development, Gene Action; Group II. Morphology, Physiology; Group III. Ecology, Natural History, Evolution, Organisms. Consult zoology adviser for a list of approved courses. (b) *Zoology Electives:* 12 elective credits in the biological sciences. Consult zoology adviser for a list of approved courses. A minimum of 15 credits must be from 400-level courses in zoology and biology. A minimum of 15 upper-division credits (300- and 400-level) in zoology and biology must be taken at the UW. A minimum GPA of 2.00 is required, to include all courses required for the major.

Bachelor of Arts

Major Requirements: A minimum of 70 credits distributed as follows: (1) *Supporting course work (minimum of 20 credits):* (a) Chemistry (15 to 20 credits): Option 1: CHEM 120, 220, 221 or Option 2: CHEM 140, 150, 160, and 223, 224 (or 237, 238, 239); (b) Mathematics (5 to 10 credits): MATH 124, 125 or Q SCI 291, 292 or STAT 311 or Q SCI 381. General physics courses are recommended, not required. (2) *50 credits in biology and zoology courses, with not more than 20 credits in 100- and 200-level courses, to include:* (a) *Introductory Biology:* BIOL 201, 202, 203 or BIOL 101, 102 (with a minimum grade of 2.5 in each), GENET 371; (b) *Zoology Core:* a minimum of 20 credits including at least

one lecture course from each of three groups and at least one course with a laboratory component: Group I. Cell Biology, Development, Gene Action; Group II. Morphology, Physiology; Group III. Ecology, Natural History, Evolution, Organisms. Consult zoology adviser for a list of approved courses. (c) *Zoology Electives:* elective credits to complete 50 total credits in the biological sciences. Consult zoology adviser for a list of approved courses. A minimum of 15 credits must be from 400-level courses in zoology and biology. A minimum of 15 upper-division credits (300- and 400-level) in zoology and biology must be taken at the UW. A minimum GPA of 2.00 is required, to include all courses required for the major.

Graduate Program

Programs of study leading to the degree of Doctor of Philosophy are available in the areas of cell biology, developmental biology, developmental genetics, ecology, evolution, behavior, invertebrate and vertebrate morphology, comparative physiology, endocrinology, and neurobiology, as well as mathematical approaches to the above topics. Interdisciplinary programs are offered in developmental biology, cell and molecular biology, and neurobiology.

Research Facilities

Modern instruments and special facilities needed for instructional and research purposes are available in Kincaid Hall. The department features an advanced, networked computer system. Extensive natural history collections are housed at the Burke Museum. The facilities of the Friday Harbor Laboratories on San Juan Island are available for research. Departmental graduate students may carry on an extensive part of their research there or at other field stations.

Special Requirements

Entering students should have preparation in several of the areas listed above, organic chemistry, physical chemistry in some cases, two quarters of college physics, and mathematics through calculus. All students are required to acquire at least three quarters of teaching experience regardless of their source of support.

Financial Aid

Normally all prospective candidates for the Ph.D. degree are supported by teaching or research assistantships or by fellowships or traineeships from national or private agencies. Summer appointments are available both on the Seattle campus and at the Friday Harbor Laboratories on San Juan Island.

Application Date

Completed applications for entry in the autumn quarter must be received by January 15.

Correspondence and Information

Graduate Program Coordinator
106 Kincaid, Box 351800

Faculty

Chair

Robert T. Paine

Professors

Beecher, Michael D. * 1978, (Adjunct); MA, 1965, PhD, 1970, Boston University; animal communication, animal behavior, sensory processes.

Boersma, P. Dee * 1974; PhD, 1974, Ohio State University; ecology and conservation biology, reproductive strategies, colonial seabird biology.

Cloney, Richard A. * 1962, (Emeritus); PhD, 1959, University of Washington; invertebrate embryology,

histology, morphogenetic movements, metamorphosis, biology of ascidians.

Daniel, Thomas L. * 1984; PhD, 1982, Duke University; functional morphology, biomechanics, mechanics and energetics of animal locomotion.

Deyrup-Olsen, Ingrid J. * 1964, (Emeritus); PhD, 1944, Columbia University; general physiology, cell-membrane phenomena.

Edmondson, W. Thomas * 1949, (Emeritus); PhD, 1942, Yale University; ecology, rotifers, limnology with emphasis on productivity of lakes.

Edwards, John S. * 1967; PhD, 1960, Cambridge University (UK); arthropod neurobiology, insect physiology and development, tundra and alpine biology.

Felsenstein, Joseph * 1968, (Adjunct); PhD, 1968, University of Chicago; evolution and population genetics.

Foe, Victoria 1991, (Research); PhD, 1975, University of Texas (Austin); cell cycle control and morphogenesis in *Drosophila* embryos.

Gorbman, Aubrey * 1983, (Emeritus); PhD, 1940, University of California (Berkeley); endocrinology and neuroendocrinology.

Hauschka, Stephen D. * 1972, (Adjunct); PhD, 1966, Johns Hopkins University; muscle differentiation.

Herring, Susan W. * 1990, (Adjunct); PhD, 1971, University of Chicago; vertebrate functional morphology, relations between muscular function and skull growth.

Hille, Merrill B. * 1976; PhD, 1965, Rockefeller University; developmental biology, gastrulation in sea urchin embryos, translational regulation during meiosis.

Huey, Raymond B. * 1977; PhD, 1975, Harvard University; evolutionary and physiological ecology, herpetology, behavior.

Illig, Paul L. * 1952, (Emeritus); PhD, 1952, George Washington University; invertebrate zoology and systematics, copepods, symbiosis of crustaceans.

Kareiva, Peter M. * 1983; PhD, 1981, Cornell University; theoretical ecology, conservation biology, agricultural ecology, plant-insect interaction.

Karr, James * 1991; PhD, 1970, University of Illinois; ecology and conservation biology, water resources, environmental sciences, natural resources.

Kenagy, George James * 1976; PhD, 1972, University of California (Los Angeles); ecophysiology and behavior, reproduction and life history, population biology, evolution, mammalogy.

Kingsolver, Joel * 1986; PhD, 1981, Stanford University; physiological ecology and evolutionary morphology of insects.

Kohn, Alan J. * 1961; PhD, 1957, Yale University; invertebrate zoology, ecology and functional morphology of marine invertebrates.

Kozloff, Eugene N. * 1966, (Emeritus); PhD, 1950, University of California (Berkeley); biology of lower invertebrates, ciliates, orthonectids, turbellarians and kinorhynchans.

Laird, Charles D. * 1971; PhD, 1966, Stanford University; cell and developmental biology, human genetics.

Martin, Arthur W. 1937, (Emeritus); PhD, 1936, Stanford University; comparative invertebrate physiology.

Moody, William J. * 1982; PhD, 1977, Stanford University; single cell electrophysiology, development of electrical properties in embryos.

Murray, James D. * 1988, (Adjunct); PhD, 1956, DSc, 1968, Oxford University (UK); mathematical biology, biological pattern formation, wound healing, spread of epidemics.

Odell, Garrett M. * 1985; PhD, 1972, Johns Hopkins University; mathematical biology, ecology, models in cell and developmental biology.

Okubo, Akira 1991, (Affiliate); PhD, 1963, Johns Hopkins University; mathematical modeling, ecology.

Orians, Gordon H. * 1960, (Emeritus); PhD, 1960, University of California (Berkeley); ecology and ethology, vertebrate social systems, community structure, plant-herbivore interactions.

Paine, Robert T. * 1962; PhD, 1961, University of Michigan; experimental ecology, organization and structure of marine communities.

Palka, John M. * 1969; PhD, 1965, University of California (Los Angeles); neurophysiology, sensory physiology, developmental neurobiology.

Pietsch, Theodore W. * 1978, (Adjunct); PhD, 1973, University of Southern California; ichthyology.

Pinter, Robert B. * 1967, (Adjunct); PhD, 1964, Northwestern University; cybernetics, robotics, biophysics.

Reeder, Ronald H. * 1981, (Affiliate); PhD, 1965, Massachusetts Institute of Technology; regulation of ribosomal RNA transcription by RNA polymerase I.

Riddiford, Lynn M. * 1973; PhD, 1961, Cornell University; insect development and physiology, invertebrate endocrinology.

Rohwer, Sievert A. * 1973; PhD, 1971, University of Kansas; ecology and evolution of social behavior, avian biology and systematics.

Schubiger, Gerold A. * 1972; PhD, 1968, University of Zurich (Switzerland); developmental genetic control of *Drosophila* embryos, pattern formation in imaginal disks.

Steiner, Robert A. * 1977, (Adjunct); PhD, 1975, University of Oregon; neuroendocrinology.

Strathmann, Richard R. * 1973; PhD, 1970, University of Washington; invertebrate development, larval ecology and developmental strategies of marine invertebrates.

Svihla, Arthur 1938, (Emeritus); MS, 1928, PhD, 1931, University of Michigan; zoology.

Truman, James W. * 1973; PhD, 1970, Harvard University; hormones and invertebrate behavior, insect physiology, circadian rhythms.

Ward, Peter D. * 1984, (Adjunct); PhD, 1976, McMaster University (Canada); invertebrate paleontology, paleobiology.

Whiteley, Arthur H. * 1947, (Emeritus); PhD, 1945, Princeton University; comparative developmental physiology of invertebrates, gene action, fertilization.

Willows, A. O. Dennis * 1969; PhD, 1967, University of Oregon; invertebrate neurophysiology, neural mechanisms underlying behavior.

Wingfield, John C. * 1985; PhD, 1973, University College of North Wales (UK); environmental and hormonal control of avian reproductive cycles.

Yao, Meng Chao * 1986, (Affiliate); PhD, 1975, University of Rochester; regulation of gene amplification and chromosome rearrangements in *Tetrahymena*.

Associate Professors

Bakken, Aimee * 1973; PhD, 1970, University of Iowa; gene regulation during oogenesis and embryogenesis, developmental, cellular and molecular biology.

Brenowitz, Elliot A. * 1987; PhD, 1982, Cornell University; animal behavior, neuroethology, neuroendocrinology, animal communication.

Graubard, Katherine * 1979, (Research); PhD, 1973, University of Washington; cellular neurophysiology, neural basis of behavior.

Griffiths, W. Mary 1961, (Emeritus); MA, 1942, PhD, 1953, University of California (Berkeley); zoology.

Kot, Mark * 1989, (Adjunct); PhD, 1987, University of Arizona; mathematical ecology, nonlinear dynamics, and population biology.

Priess, James R. * 1993, (Affiliate); PhD, 1983, University of Colorado (Boulder); reliability models, fault trees.

Wakimoto, Barbara T. * 1984; PhD, 1981, Indiana University; developmental genetics, gene expression and chromosome organization in eukaryotes.

Assistant Professors

Cooper, Mark S. * 1990; PhD, 1985, University of California (Berkeley); cellular physiology and cell motility in developing tissues.

Dethier, Megan 1991, (Research); PhD, 1981, University of Washington; marine community ecology, seaweed ecology, classification and monitoring of intertidal habitats.

Edwards, Scott V. 1994; PhD, 1992, University of California (Berkeley); molecular population genetics and evolution, avian comparative biology and systematics.

Parrish, Julia 1995, (Research); PhD, 1988, Duke University; behavioral ecology, conservation biology, predator-prey interactions.

Ramenofsky, Marilyn 1991, (Research); PhD, 1982, University of Washington; environmental endocrinology, physiology and behavior of avian migration.

Wright, Robin L. * 1990; PhD, 1985, Carnegie-Mellon University; membrane dynamics and regulation of sterol biosynthesis in yeast.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

ZOOL 100 Evolution and Human Behavior (3) NW Introduction to evolution by natural selection, examining the light it can throw on human biology and behavior in such areas as the nature of sex differences, sexual conflict, and conflict between parents and children. Does not fulfill major requirements. Offered: jointly with BIO A 100.

ZOOL 114 Evolution (2) NW Kingsolver Evolutionary biology for nonmajors. Evolutionary history of the earth and various theories of evolution.

ZOOL 118 Survey of Physiology (5) NW Human physiology, for nonmajors and health sciences students. Offered: AWWSpS.

ZOOL 119 Elementary Physiology Laboratory (1) NW Prerequisite: concurrent or previous enrollment in 118. Offered: AWWSpS.

ZOOL 220 Diversity in Animals (5) NW Huey Morphological, functional, and ecological diversity within the major phyla of animals. Students who have taken 330, 362, 430, 433, 434, or 453 are strongly discouraged from taking this course, due to substantial overlap of material. Prerequisite: high school biology or permission of instructor.

ZOOL 301 Introductory Physiology (4) NW Fundamentals of physiology; biochemistry of cell constituents, environment of the cell, bioenergetics, membranes, control mechanisms. Laboratory project required. Prerequisites: chemistry through organic, one year of college physics, 10 credits in biological sciences.

ZOOL 330 Natural History of Marine Invertebrates (5) NW Kohn Field and laboratory course emphasizing the habits, habitats, adaptations, and interrelationships of marine animals. Students may be required to share a portion of the transportation costs of field trips.

ZOOL 362 Natural History of Vertebrates (5) NW Field and laboratory course on the classification, ecology, adaptations, and natural history of fishes, amphibians, reptiles, birds, and mammals. Students may be required to share a portion of the transportation costs of field trips. Prerequisite: permission of instructor.

ZOOL 403 Comparative Vertebrate Histology (5) NW Microscopic and submicroscopic anatomy of vertebrates. Emphasis on mammals. Light microscopy and interpretation of ultrastructure. Functions of basic tissue types and organs as related to structure. Prerequisite: BIOL 202.

ZOOL 408 Mechanisms of Animal Behavior (4) NW *Beecher, Brenowitz* Comparative exploration of physiological and perceptual mechanisms that control behaviors necessary for survival and reproduction in animals. Model systems discussed include animal communication, mate choice, escape behavior, learning and memory, orientation, biological rhythms, foraging behavior. Prerequisites: PSYCH 200 or BIOL 101 and 102 or permission of instructor. Offered: jointly with PSYCH 408.

ZOOL 409 Sociobiology (5) NW *Rohwer* Biological bases of social behavior, emphasizing evolution as a paradigm. Topics are: individual versus group selection, kin selection, altruism, group versus individual living, mating systems, parental care of offspring, and competitive strategies. Prerequisites: BIOL 202 and 203 or PSYCH 200, or equivalent. Offered: jointly with PSYCH 409.

ZOOL 410 Ethology and Ecology Laboratory (4) NW *Boersma* Field projects on foraging and social behavior, species interactions and structure of terrestrial and marine communities, including special student research problems. Students may be required to share a portion of the transportation costs of field trips. Prerequisite: permission of instructor. Offered: Sp.

ZOOL 414 Molecular Evolution (4) NW Survey of empirical approaches to the study of molecular evolution and ecology, drawing on examples from a variety of taxa and the recent literature. Topics include DNA sequencing and systematics, fingerprinting approaches in behavioral ecology, and adaptive evolution at the molecular level.

ZOOL 430 Marine Zoology (8) NW *Strathmann* Survey of groups of invertebrate animals represented in marine environments; natural history, ecology, distribution, habitat, adaptation, and trophic interrelationships. Concurrent registration in BOTANY 445 required at Friday Harbor. Prerequisites: 20 credits in biological sciences and permission of Director of Friday Harbor Laboratories. Offered: at Friday Harbor Laboratories; Sp.

ZOOL 432 Marine Invertebrate Zoology (9) NW Comparative morphology and biology of marine invertebrates. Laboratory study covers the structure and interrelationships among marine invertebrate animals. Representatives of all major and most minor phyla are collected, observed alive, and studied in some detail. Not open for credit to students who have taken 433 or 434. Prerequisites: BIOL 202 or equivalent and permission of Director of Friday Harbor Laboratories. Offered: at Friday Harbor Laboratories; S.

ZOOL 433, 434 Invertebrate Zoology (5, 5) NW *Kohn* Comparative biology and morphology of invertebrates. Laboratory work emphasizes structures and functions. 433 deals with principles of animal organization, Protista, simpler multicellular animals, echinoderms, and chordates. 434 emphasizes annelids and related worms, mollusks, and arthropods. Not open to students who have taken 430 or 432. Prerequisite: one year of biology. Offered: A,W.

ZOOL 435 Parasitology (5) NW General course covering the principles of parasitism and the major groups of animal parasites. Prerequisite: 20 credits in biological sciences or permission of instructor.

ZOOL 438 Comparative Endocrinology (3) NW *Wingfield* Hormonal integration of living processes at all levels in animals: molecules, cells, organs, organisms, populations. Prerequisite: one year of biology. Recommended: a 400-level course in physiology, biochemistry, or histology.

ZOOL 439 Comparative Endocrinology Laboratory (2) NW *Wingfield* A broad introduction to endocrine techniques with appropriate experiments to accompany and enlarge on material presented in 438. Prerequisites: 438 and permission of instructor.

ZOOL 440 Biomechanics (4) NW *Daniel* Physical biology emphasizing a mechanical approach to ecological, evolutionary, and physiological questions. Basic principles underlying fluid and solid mechanics to explore responses of animals to flows, loads, and motions. Recommended: some familiarity with calculus and introductory physics.

ZOOL 444 Entomology (3) NW *Edwards* Biology of terrestrial arthropods, with emphasis on insects. Structure, classification, physiology, and ecology of insects. Interrelationships of insects and man. Prerequisite: 15 credits in biological sciences or permission of instructor. Offered: Sp.

ZOOL 445 Entomology Laboratory (2) NW *Edwards* Structure and function of arthropods, with emphasis on insects. Field studies and taxonomy of important insect groups. Students may be required to share a portion of the transportation costs of field trips. Prerequisites: concurrent registration in 444 and permission of instructor. Offered: Sp.

ZOOL 448 Concepts of Nervous System Function (3) NW *Palka* Broad examination of integrative mechanisms in central nervous system function, with emphasis on sensory processing, plasticity, and control of behavior. Examples are taken from a variety of animal groups.

ZOOL 449 Concepts of Nervous System Function Laboratory (2) NW *Palka* Experiments to accompany material presented in 448. Prerequisites: 408, 448, or other courses with a strong neuroscience component.

ZOOL 451 Vertebrate Zoology (5) NW *Kenagy* Integrated exploration of the biology of vertebrate animals, emphasizing their diversity, adaptations, life styles, and evolutionary history. Introduces aspects of behavior, physiology, morphology, and ecology that emerge from the comparative study of vertebrates. Laboratory includes local field trips, films, and writing workshop. Prerequisites: BIOL 201, 202, 203.

ZOOL 453 Comparative Anatomy of Vertebrates (5) NW Comparison of the structure of vertebrates with emphasis on functional morphology, evolution, and biomechanics. Prerequisite: BIOL 202. Recommended: 451. Offered: W.

ZOOL 455 Developmental Biology of Animals (4) NW *Schubiger* Embryology and subsequent development of vertebrate and invertebrate animals, including frogs, mammals, chicks, insects, echinoderms. Morphological changes in developing animals; experimental analysis of developing systems; underlying genetic and biochemical regulation of development. Prerequisites: BIOL 201, 202, 203, or permission of instructor. Recommended: some genetics, cell biology, or biochemistry.

ZOOL 456 Developmental Biology of Animals Laboratory (3) NW *Shellenbarger* Normal development of living embryos (frog, chick, insect, echinoderm). Internal anatomy of embryos on prepared slides. Comparisons between vertebrate and invertebrate animals. Prerequisites: 455 or equivalent; permission of instructor.

ZOOL 457 Methods and Problems in Development (3) NW *Bakken, Schubiger, Wakimoto* Special topics in development. Integrating classical and current approaches. Developmental genetics, experimental embryology, molecular mechanisms of developmental regulation, and gene function in cell determination and cell differentiation in animal systems. Prerequisites: 455 or equivalent and permission of instructor.

ZOOL 464 Natural History of Birds (5) NW *Rohwer, Wingfield* Field, lecture, and laboratory study of birds framed in biological theory rather than taxonomy. Breeding systems, brood parasitism, appearance, molt, migration, orientation, social behavior, song, and flight are emphasized. Includes Saturday and weekend field trips for which students are required to share a portion of transportation costs. Prerequisites: BIOL 201, 202, 203 or equivalent, and permission of instructor. Offered: Sp.

ZOOL 465 Natural History of Mammals (5) NW *Kenagy* Field, lecture, and laboratory course introducing mammals in a general biological context, emphasizing ecology, evolution, behavior, morphology, and adaptation to the environment. Fieldwork focuses on rodent populations and their habitats in Washington State. Includes weekend field trips, for which students may be required to share a portion of transportation costs. Prerequisites: BIOL 201, 202, 203, and permission of instructor. Recommended: 453 and BIOL 472.

ZOOL 467 Comparative Animal Reproduction (3) NW *Ramenofsky, Wingfield* Reproductive mechanisms, environmental influences on reproductive endocrinology, physiology, behavior, ecology of vertebrates. Discussions extend from organismal to cellular level, and focus on diversity of reproductive patterns among vertebrates. Prerequisite: one year of college-level biology. Recommended: biochemistry and physiology.

ZOOL 468 Comparative Animal Reproduction Laboratory (2) NW *Ramenofsky, Wingfield* Laboratory and field studies on animal reproduction involving endocrinology, anatomy, behavior, and ecology. Accompanies, supplements, and extends material presented in 467. Prerequisites: 467 or 469, may be taken concurrently, and permission of instructor.

ZOOL 470 Techniques for Mathematical Biology (3) NW *Odell* Equips students to use, rather than prove, many applied mathematics techniques essential in mathematical biology. Includes instruction to use symbolic computation software (Mathematica, Macsyma) to do by computer the kind of mathematical formula manipulation that mathematicians formerly performed by hand. Prerequisite: calculus. Recommended: linear algebra.

ZOOL 471 Models in Biology (4) NW Explores use of models in biology in a wide range of topics, including morphogenesis, nerve signals, ecological interactions, population biology, and evolutionary theory. Emphasis on the biological insights models can provide rather than mathematical techniques. Prerequisites: MATH 124, 125.

ZOOL 475 Biogeography (3) NW Analysis of the historical and ecological determinants of current and past distributions of organisms. Integrates techniques developed by taxonomists, paleontologists, geologists, evolutionists, ecologists, and biogeographers to elucidate relationships between geographical distributions and continental drift, ecological interactions, climate, and the dispersal abilities of organisms.

ZOOL 484, 485 Animal Physiology (3, 3) NW *Huey, Riddiford, Truman* Physiology at levels of organisms and behavior, organ systems, and cells—an evolutionary and integrative perspective. 484 Organismal physiology: metabolism, temperature, locomotion, osmoregulation, circulation, digestion. 485 Integrative physiology: neurons, muscles, and hormones. Prerequisites: introductory biology, chemistry, and physics.

ZOOL 486, 487 Animal Physiology Lab (2, 2) NW *Huey, Riddiford, Truman* Experimental design and techniques, data analysis, written reports. 486: project labs in organismal-level physiology. 487: experiments in integrative physiology. Prerequisites: concurrent or previous enrollment in 484 for 486, 485 for 487.

ZOOL 490 Undergraduate Seminar (3, max. 6) NW Supervised reading and group discussion on selected concepts of zoology. Prerequisites: 20 credits in zoology and permission of instructor.

ZOOL 491 Topics in Zoological Research (1, max. 3) NW Undergraduate seminar on research problems currently under investigation by department faculty members. Includes discussions and laboratory demonstrations of aims, techniques, and results of zoological research. Credit/no credit only. Prerequisites: upper-division standing and permission of instructor.

ZOOL 498 Special Problems in Zoology (1-5, max. 15) Prerequisite: permission of instructor. Offered: AWSpS.

Courses for Graduates Only

ZOOL 506 Topics in Developmental Biology (1-2, max. 15) Seminars and discussions of aspects of growth of special current interest. Prerequisite: permission of instructor.

ZOOL 509 Topics in Vertebrate Biology (1-3, max. 15) Rohwer Detailed consideration of topics in behavioral integration, communication, and social organization. Prerequisite: 409 or PSYCH 409 or equivalent.

ZOOL 517 Analytical Development Physiology (9) Modern analysis of oogenesis, fertilization, embryonic organization and differentiation from an experimental and comparative point of view, and other advanced topics. Laboratory emphasizes experimental study of metabolic, biochemical, and biophysical properties, structural and mechanical features, subcellular localization, and microscopic organization of gametes and embryos of various marine invertebrates. Prerequisite: permission of instructor.

ZOOL 520, 521, 522 Seminar (1, 1, 1) Credit/no credit only. Offered: A, W, Sp.

ZOOL 525 Seminar in Mathematical Biology (2, max. 12) Daniel, Odell, Kareiva Examines mathematical models in a broad range of topics in biology, from cellular and subcellular to organismal and population phenomena. Participants present research topics, supplemented with selected readings from the primary literature, showing how mathematical methods and experimental or field biology are merged to predict observable phenomena. Credit/no credit only.

ZOOL 528 Advanced Topics in Physiology (1-3, max. 15) Recent developments. Prerequisite: one 400-level course in physiology.

ZOOL 529 Advanced Topics in Physiology (1-3, max. 15) Recent developments. Credit/no credit only. Prerequisite: one 400-level course in physiology.

ZOOL 530 Science and Environmental Policy (3) Role of science and scientists in formulating public policy related to the environment. Conceptualizes policy processes as a means of understanding oppor-

tunities for, and limits of, science in development and implementation of public policy. Prerequisite: concurrent registration in 531. Offered: W.

ZOOL 531 Science and Environmental Policy: Case Histories (2) Examples of the use of scientific analysis in the development of environmental policies. Prerequisite: concurrent registration in 530. Offered: W.

ZOOL 532 Internship Seminar (1) Preparation for an analytical paper concerning the role of science in decision making. Focuses on the agency or firm in which the student served as an intern. Prerequisites: 530, 531.

ZOOL 533 Advanced Invertebrate Zoology (9) Invertebrate fauna of the San Juan Archipelago. Topic changes from year to year. Individual research projects are emphasized. Prerequisites: 10 credits in invertebrate zoology or equivalent and permission of Director of Friday Harbor Laboratories. Offered: at Friday Harbor Laboratories; SpS.

ZOOL 536 Comparative Invertebrate Embryology (9) Morphological and experimental studies of development of selected types of marine invertebrates. Prerequisites: 433, 434, 456, and permission of Director of Friday Harbor Laboratories. Offered: at Friday Harbor Laboratories; Sp, S.

ZOOL 538 Advanced Invertebrate Physiology (9) General and comparative aspects of nerve and muscle physiology with particular emphasis upon neuronal control of behavior, neuronal interactions, and other advanced topics determined by visiting faculty. Extensive laboratory experience, including intracellular and extracellular stimulating and recording techniques. Recommended: background in cellular physiology and invertebrate morphology. Offered: at Friday Harbor Laboratories; Sp.

ZOOL 540 Topics in Cellular Developmental Biology (1, max. 16) Bakken, Cooper, Hille, Moody Seminar on current topics dealing with cellular aspects of developmental biology. Variable topics on both vertebrate and invertebrate development. Credit/no credit only.

ZOOL 556 Insect Development (3) Characterizes developmental processes and their adaptations in diverse insect groups. Emphasizes hormonal control mechanisms in metamorphosis, polymorphism and diapause, regeneration and genetic analysis of development. Prerequisites: 456 or equivalent, BIOL 202 or equivalent, or permission of instructor.

ZOOL 557 Topics in Molecular Insect Endocrinology (1, max. 12) Riddiford Assigned reading and discussion of current topics in molecular insect endocrinology. Prerequisite: 438 or 485 or equivalent.

ZOOL 568 Chemical Integration (2, max. 6) Wingfield Graduate seminar dealing with current problems in endocrinology and neuroendocrinology. Credit/no credit only. Prerequisite: permission of instructor.

ZOOL 570 Evolutionary Physiological Ecology (2, max. 18) Huey, Kingsolver Assigned reading, discussion, and student presentations on issues in physiological and ecological aspects of evolution. Topics variable. Credit/no credit only. Prerequisites: BIOL 454 and 472 or equivalent.

ZOOL 571 Current Topics in Evolution (1, max. 18) Huey, Kingsolver Assigned reading and discussion of current topics in evolution. Topics variable. Credit/no credit only. Prerequisite: BIOL 454 or equivalent.

ZOOL 572 Topics in Ecology (1-3, max. 16) Graduate seminar on modern problems in ecology. Prerequisites: BIOL 472 or equivalent, and permission of instructor.

ZOOL 573 Physiological Ecology (1-3, max. 15) Huey, Kenagy, Kingsolver Perspectives and principles of research in the physiology and behavior of animals in an ecological and evolutionary context, emphasizing whole animals and integration with diverse levels of biological organization. Prerequisite: permission of instructor.

ZOOL 575 Topics in Historical Ecology (2, max. 14) Paine Assigned reading and discussion of the history of conceptual issues or significant individuals. Topics variable. Credit/no credit only. Prerequisite: BIOL 472 or equivalent.

ZOOL 577 Marine Invertebrate Biology (1, max. 8) Kohn Seminar on current topics in biology or marine invertebrates at all levels of biological organization. Topics variable. Credit/no credit only. Prerequisite: 433 and 434 or equivalent.

ZOOL 578 Advanced Ecology (5) Kareiva Strategies of reproduction, habitat selection, foraging and spacing; theory of competition and predator-prey interactions; niche theory and community structure. Prerequisites: BIOL 472 or equivalent, and permission of instructor.

ZOOL 579 Criticism in Evolutionary Ecology and Behavior (2, max. 16) Rohwer Critical analysis of manuscripts under preparation that treat evolutionary ecology, morphology, and behavior. Topics variable. Credit/no credit only. Prerequisite: 409 or equivalent introduction to evolutionary thinking.

ZOOL 580 Environmental Physiology and Behavior (2, max. 14) Kenagy, Wingfield Current conceptual issues and research results. Topics vary. Prerequisite: two upper-division courses in physiology or behavior or equivalent. Credit/no credit only.

ZOOL 600 Independent Study or Research (*) Credit/no credit only. Offered: AWSpS.

ZOOL 700 Master's Thesis (*) Credit/no credit only. Offered: AWSpS.

ZOOL 800 Doctoral Dissertation (*) Credit/no credit only. Offered: AWSpS.

School of Business Administration

Dean

William D. Bradford
114 Mackenzie

Associate Dean for Academic Programs

Douglas L. MacLachlan
116 Mackenzie

Men and women embarking on business careers will have the opportunity to influence many of the social, political, and economic forces in today's world. The School of Business Administration prepares students for professional careers in management and related disciplines in both the private and public sectors.

The School of Business Administration offers an undergraduate program leading to the degree of Bachelor of Arts (BA) in Business Administration and graduate programs leading to the degrees of Master of Business Administration (MBA), Executive Master of Business Administration (EMBA), Master of Professional Accounting (MPAcc), and Doctor of Philosophy (PhD). Evening and/or part-time BA and MBA programs are recent additions.

Business Administration became an independent unit within the University system in 1917. It has been accredited by the American Assembly of Collegiate Schools of Business since 1921.

Facilities and Services

Most business administration classes and activities are in four buildings. Balmer Hall, named for Thomas Balmer, former president of the University Board of Regents, contains classrooms, part of the business administration library, and computer labs. Mackenzie Hall, named in memory of Prof. Donald Mackenzie, Chair of the Department of Accounting from 1949 to 1955, contains the Dean's Office, the Undergraduate Program Office, the PhD Program Office, Business Administration Computer Services (BACS), Office of Development and Community Relations, faculty offices, five department offices, and other business administration program offices. Nearby Lewis Hall and its annex contain the Graduate Program Office, the Business Career Center, and other faculty and administrative offices. A fourth building, newly constructed on the north side of Balmer, has three distinct components: the Seafirst Executive Education Center (which includes the James B. Douglas Executive Forum), the Boeing Auditorium, and the Albert O. and Evelyn Foster Business Administration Library.

To serve the continuing education needs of business persons, the School of Business Administration offers a number of short programs, either University-initiated or cosponsored with various community and industry organizations. The nine-month management program for middle- to upper-level managers strengthens understanding and skills in all areas of management and provides an opportunity for successful managers to learn from each other. Short courses and workshops are offered throughout the year in all areas of management, including marketing strategy, sales management, managing change, finance and accounting for non-financial executives, marketing research, and many others. In addition, the School develops and runs in-house training programs under contract with individual companies and organizations. Information on continuing education programs may be obtained from

the Office of Executive Programs, 543-8560, FAX: 685-9236, or email at hnorman@u.washington.edu.

International Business Programs

International business programs are coordinated and developed by the School's Center for International Business Education and Research (CIBER). These activities include special graduate and undergraduate certificate programs, seminars, special guest speaker programs, and graduate foreign-exchange programs. Although the Marketing and International Business Department offers a general curriculum in international business, each of the five academic departments within the School maintains faculty with special international teaching and research expertise. Internationally-oriented courses are offered by each department.

At the undergraduate level, the School offers the Certificate of International Studies in Business (CISB) Program. Students in the program complete the same demanding business curriculum as other students and enhance this training with foreign language study, area studies, and an international experience. The program requires that students have a solid foundation in one of six language tracks: Chinese, French, German, Japanese, Russian, and Spanish; a seventh custom track for other languages is also an option.

The MBA-level International Management Certificate Program (IMCP) provides opportunities for MBA students to integrate their graduate course work with advanced foreign language and area studies, an overseas business internship, a foreign study program, and international business course work. Students may spend a total of nine months outside the United States and may specialize in one of five language tracks: Mandarin Chinese, German, Japanese, Russian, or Spanish.

Questions regarding these programs may be directed to the Program Assistant, CIBER, 303 Lewis, (206) 685-3432; FAX: (206) 543-6872; email: clairelu@u.washington.edu.

Business Career Center

202 Lewis

Director

JoAnne Starr

Associate Director

Janelle LaFond

The Business Career Center serves as a resource for business students. Among the services provided to all business students are the ASK (Alumni Sharing Knowledge) mentoring program and a job listing service for career, internship, and part-time positions. Undergraduate business career counseling and on-campus recruitment is provided by the UW Center for Career Services in 301 Loew.

All MBA and MPAcc career services are coordinated through the Business Career Center, including career counseling and career management workshops, the administration of special career events such as firm nights, company presentations, and on-campus MBA and MPAcc recruitment. Questions regarding these programs and services may be directed to the Director, 685-2410.

Honor Societies

Beta Gamma Sigma is the national scholastic honor society in the field of business. Election to membership is available to both undergraduate and graduate students in business. Selection is based upon outstanding scholastic achievement.

Beta Alpha Psi is the accounting honor society. Membership is based primarily on scholastic achievement, but some community service is also required. Beta Alpha Psi provides a mechanism for students, professionals, and educators to meet on both formal and informal bases.

Student Organizations

Chapters of Alpha Kappa Psi, Association of Black Business Students, Hispanic Business Association, International Association of Students in Economics and Business Management, American Marketing Association, the Accounting Society, National Human Relations Management Association, Business Information Technology Association, Phi Beta Lambda, and Student Advisory Council provide opportunities for undergraduate students to meet informally and to participate in a variety of projects and events.

The goals and interests of graduate students are served by the MBA Association, the Center for Entrepreneurship, Challenge for Charity, Graduate Consulting Club, Graduate Finance Club, Graduate International Business Association, Business Diagnostic Center, Graduate Accounting Club, Environmental Business Alliance, Graduate Marketing Club, Toastmasters, and the Doctoral Association.

Undergraduate Program

Undergraduate Office

137 Mackenzie

Director

Patsy Wosepka

Associate Director

Elaine G. Solomon

Academic Advisers

Holly Bauman

Bradford Broadnax

Nancy Clarke

William Jackson—Evening Degree Program

The School of Business Administration admits only for autumn quarter, offering application for early admission to those attending the UW and prepared to declare a business major during their freshman year, and application for upper-division admission to all other students. Admitted students may elect to take classes the summer quarter prior to autumn quarter admission.

Academic advisers are available to help with selecting classes, adding and dropping classes, long-range planning, applying for graduation, making referrals to other campus resources and programs, and providing any needed general assistance. The Undergraduate Office publishes a weekly newsletter that provides information to majors and premajors.

Evening Degree Program

Students may earn a Bachelor of Arts in Business Administration through the Evening Degree Program. Admission and graduation requirements are identical to requirements for the day business program, shown below. The Evening Degree Program offers concentrations in Marketing, Human Resources Management, and General Business.

Undergraduate Business Educational Opportunity Program

137 Mackenzie

Director

Jeffrey Hedgepeth

Special admissions assistance, advising, and support services are available for minority students underrepresented at the University, and students from educationally and economically disadvantaged backgrounds. Any student who qualifies for the UW Educational Opportunity Program is eligible. Special scholarships are also available for underrepresented minority students. Academic advisers have information on the Business Educational Opportunity Program.

Bachelor of Arts in Business Administration

Specific School Admission Requirements

Early Admission Group (EAG): Open to students who began their studies at the UW as freshmen, have been enrolled no more than three quarters, and have completed 30 graded credits at the UW to include the following (or equivalents): ECON 200; MATH 112 or 124; an approved English composition course, and pre-college test scores (ACT or SAT). Students must be currently enrolled UW students who have completed autumn and winter quarters in residence.

Upper-Division Admission Group (UAG): Students must present a minimum of 60 academic credits at the time of application including the following graded credits: ACCTG 215; ECON 200; MATH 112 or 124; an approved English composition course; O E 200. In addition, the following courses must be completed prior to admission in autumn quarter: ACCTG 225; ECON 201; QMETH 201. Students admitted to the UW as freshmen are expected to take the accounting, organization and environment, and quantitative methods courses in residence.

Qualified applicants who meet the University and School of Business Administration requirements at the time they transfer are eligible to be placed directly in the School; those with at least 45 credits and a minimum 2.85 GPA who meet the University entrance requirements, but not the business administration requirements, are eligible to be placed in the College of Arts and Sciences as pre-business majors.

For admission to the School of Business Administration, a School of Business application, together with all supporting materials, must be on file by April 10. Records of all course work completed by the deadline must be submitted at the time of application. Since eligible applicants exceed the space available, acceptance is competitive. Admission will be based on evaluation of five factors: (1) pre-college test scores (for Early Admission Group); (2) overall scholastic record; (3) grades in pre-business courses; (4) written communications skills; and (5) evidence of leadership skills, community activities, and the promise of achievement in a business or professional career. In addition, the School of Business is committed to the University's affirmative action policy. Consideration will therefore be given in the admissions process to creating ethnic diversity. No student will be admitted with a cumulative GPA less than 2.50 for all college credits or less than 2.50 for all required business administration courses. A student who has previously attended the UW also must have GPAs of at least 2.50, both UW cumulative and in UW business administration courses (including approved substitutes and required economics courses). The GPA for admission will usually be higher.

Accounting Concentration: The notation "Accounting" will be included on the permanent record, or transcript, of a student who graduates with a degree of Bachelor of Arts in Business Administration and who completes with a cumulative GPA of at least 2.00 the following courses: ACCTG 301, 302, 303, 311, 330, 411, 421, and 6 elective credits in 400-level accounting courses, except 401 and 499. Students who have completed ACCTG 505 may not apply to the accounting concentration.

Specific School Graduation Requirements

General Education Requirements: The following must be selected from the University Areas of Knowledge courses. (Students from community colleges in Washington should check the *Transfer Guide* or consult with their community college adviser for equivalent courses. Students from other four-year schools should see an adviser at their school.) 20 credits in Visual, Literary, & Performing Arts; 20 credits in Individuals & Societies, including 10 credits in microeconomics and macroeconomics (ECON 200 and 201); 20 credits in

the Natural World, including 5 credits in calculus (MATH 112 or 124)—most students need precalculus before taking college calculus (some precalculus courses qualify for the Natural World requirement); 5 credits in English composition.

Specific Business Requirements: ACCTG 215, 225 (previously 210, 220, 230); QMETH 201; O E 200; B ECN 300; MKTG 301; I S 300; I BUS 300; OPMGT 301; FIN 350; HRMOB 400; O E 302, 440; B POL 470 or 471 or 480; and a minimum of 15 credits of 300- or 400-level business administration electives (or area of concentration); two writing-intensive courses—one from B CMU 301, B CMU 410, ENGL 281, ENGL 381; one from English composition, or from the remaining three courses listed immediately above, or from any W course.

No more than 7 lower-division business elective credits; a minimum of 72 non-business administration credits, and 72 business administration credits, including those listed under the preceding requirements sections; a cumulative GPA of at least 2.50 in all business administration credits earned at the UW; and a cumulative GPA of 2.50 for all UW credits. Students must complete six of the ten upper-division core courses, including Business Policy, and 35 of the 54 required upper-division business credits at the UW. Students who have taken more than four of the ten upper-division core business courses at another school will not usually be admitted to the School of Business Administration.

Double Baccalaureate and Second Baccalaureate

Students who wish to earn more than one baccalaureate degree should consult an academic adviser in the business administration undergraduate office, either during or before the junior year. Persons seeking a second baccalaureate should apply at the University's Office of Undergraduate Admissions. To be considered, applicants must complete by quarter of entry the same prerequisites for admission as applicants for the first baccalaureate degree. Since the number of eligible applicants exceeds that for which space is available, acceptance will be competitive, based on the criteria listed above for selection of first baccalaureate degree applicants. The School of Business will use the GPA for the last 90 credits earned.

Graduate Program

Graduate Office

110 Mackenzie

Robert Higgins, Faculty Director, Graduate Program Coordinator

Peter A. Frost, Director, PhD Program; Alternate Graduate Program Coordinator

James M. Danko, Director, MBA Program

Nina Sanders, Director, EMBA Program

Admission

Qualified students who are graduates of the University of Washington or of other accredited colleges or universities may be admitted autumn quarter to graduate degree programs. GPA, Graduate Management Admission Test score, work experience, educational and professional objectives, and other factors are considered in the admission process. Inquiries concerning the details of admission should be made to the specific degree program of interest, University of Washington, Graduate School of Business Administration, Mackenzie Hall, Box 353200, Seattle, WA 98195.

Application Procedure

Applications to graduate programs are considered in the winter and spring of each year for entry in the autumn quarter. The formal deadlines for application are: February 1 for the PhD program, February 1 for international applicants, March 1 for domestic applicants for the MBA, and April 15 for the Executive MBA and MPAcc programs.

The Graduate School of Business Administration offers programs of study leading to the advanced degrees of Master of Business Administration, Executive Master of Business Administration, Master of Professional Accounting (Taxation), and Doctor of Philosophy.

Master of Business Administration

The Master of Business Administration degree program has been designed for students with varied academic backgrounds (e.g., arts and sciences, engineering, business administration) who are preparing for a professional career in management. A period of two academic years, or 96 academic credits, is required for most students to complete the MBA program. The program consists of 48 credits of required first-year courses and 48 elective credits. The student may take no more than 16 credits in any one elective area.

The part-time MBA program, initiated in the fall of 1996, is targeted toward fully employed college graduates with relatively little managerial experience, who seek a management degree that can be earned outside their regular working hours. Instruction takes place in the evenings and on some weekends. The program contains similar curricula to the full-time MBA program. Normal completion of degree requirements is approximately three years.

Since the autumn of 1983, the Executive MBA Program has provided an additional pathway to the Master of Business Administration degree. The EMBA Program provides an intensive executive development experience to a select group of midcareer managers who continue to work full-time while pursuing the MBA degree. Candidates for this two-year program should have seven or more years of increasingly successful work experience including three to four years in management, and currently hold mid- or top-level management positions. They are typically sponsored by their organizations and have been identified as employees with high potential to advance as general managers. Students are selected to ensure diversity of industry, functional areas and organizational size. Classes meet all day on alternate Fridays and Saturdays during the academic year. In addition, students attend spring and fall residence sessions each year. While the curriculum scope is comparable to that of the regular MBA program, the pace is more intense and the perspective is that of a general manager. There are 21 required courses and no electives. Applications are accepted throughout the year; with an application deadline of April 15 for the class beginning each autumn. Late applications are handled on a space available basis.

Master of Professional Accounting

The Master of Professional Accounting degree program prepares individuals for high-level careers in the specialized fields of professional accounting and taxation. The MPAcc degree provides an opportunity for graduate study in accounting beyond the typical undergraduate accounting major and in greater depth than that offered by an accounting concentration in an MBA program. The MPAcc (Taxation) degree track is an intensive detailed study of federal taxation that is designed to provide a working knowledge of tax law in both a transactional and theoretical framework. The taxation track is designed to be completed in two years for individuals without prior study in accounting or business. For those who have an undergraduate degree in accounting or an MBA, the MPAcc degree program may be completed in one calendar year.

Doctor of Philosophy

The Doctor of Philosophy degree in Business Administration is designed primarily for students who wish to pursue academic careers, although the training is also useful for students oriented toward research positions in business or other institutions. Students must select a major area of concentration and two or three minor supporting areas. Major areas of concentration include accounting, finance, human resource management and organizational behavior, information systems, marketing, operations management, operations research, and strategic management. All students must take research methods as a minor area. The other minor areas can be chosen from either international business, the above list of major areas, or from other areas in the University outside the School of Business Administration, such as economics, psychology, statistics, mathematics, and computer science. The minor areas should support and complement the major area.

Graduation requirements: Each PhD student must successfully complete course work in the major and minor areas, pass area examinations, successfully defend the thesis proposal in the General Examination, and finally, defend the completed dissertation in the Final Examination.

Doctoral students with strong backgrounds can complete the doctoral program in three years, but most students take four to five years. The School's goal is to make financial aid available, in the form of research and teaching assistantships, to all of its doctoral students. In addition to service appointments, fellowships are available on a competitive basis to support students engaged in their dissertation research during the final part of their programs.

Special Requirements

Applicants to graduate business programs are required to submit scores on the Graduate Management Admission Test. Those admitted to the MBA program must demonstrate understanding of the fundamental concepts of calculus and proficiency in the use of computers.

Correspondence and Information

Information on graduate programs may be obtained from the Graduate Program Office at 543-4661, the Executive MBA Office at 685-1333, and the PhD Program Office at 543-4111.

Accounting

Accounting involves development and communication of financial and operational information for business and nonprofit economic entities. The curriculum coverage includes understanding accounting information systems, using accounting information in managerial decision-making, preparing and auditing financial statements under generally accepted accounting and auditing standards, and understanding the fundamental aspects of personal and corporate taxation. Elective courses provide in-depth instruction in managerial and financial accounting, not-for-profit accounting, and taxation. Courses provide a foundation for careers in accounting (public, industrial, private, or governmental), for a general business career, or for other professions such as law.

Faculty

Chair

James Jambalvo

Professors

Alkire, Durwood L. 1980, (Emeritus); BA, 1935, University of Washington; taxation.

Berg, Kenneth B. * 1950, (Emeritus); MS, 1941, PhD, 1952, University of Illinois; financial and managerial accounting.

Biddle, Gary Clark * 1984; PhD, 1980, University of Chicago; financial and managerial accounting.

Bowen, Robert M. * 1978; PhD, 1978, Stanford University; financial and managerial accounting.

Dukes, Roland E. * 1979; PhD, 1974, Stanford University; financial and managerial accounting.

Heath, Loyd C. * 1962; PhD, 1965, University of California (Berkeley); financial accounting.

Jambalvo, James * 1977; PhD, 1977, Ohio State University; managerial accounting, auditing.

Mueller, Fred J. * 1953, (Emeritus); PhD, 1956, Ohio State University; auditing, not-for-profit, tax accounting.

Mueller, Gerhard G. * 1960; MBA, 1957, PhD, 1961, University of California (Berkeley); financial accounting and reporting, international accounting.

Noreen, Eric W. * 1976; PhD, 1976, Stanford University; managerial accounting.

Ramanathan, K. V. * 1971; PhD, 1969, Northwestern University; managerial accounting.

Sundem, Gary L. * 1971; PhD, 1971, Stanford University; information systems, managerial accounting, information economics.

Associate Professors

Burgstahler, David C. * 1980; PhD, 1981, University of Iowa; financial and managerial accounting, statistical methods.

Kelly, Lauren * 1982; PhD, 1975, University of Alabama; financial accounting, interface between corporate management and accounting standards.

Sefcik, Stephan E. * 1986; PhD, 1983, University of Illinois; financial reporting and environmental accounting issues.

Shevlin, Terrence J. * 1985; PhD, 1986, Stanford University; financial accounting, capital markets, taxation.

Shores, Donna J. * 1986; MS, 1980, University of Wisconsin; PhD, 1986, Stanford University; financial and managerial accounting.

Assistant Professors

Kennedy, S. Jane 1991; MBA, 1977, University of Alberta (Canada); PhD, 1992, Duke University; financial and managerial accounting.

Papernan, Joseph B. 1995, (Acting); MS, 1984, Purdue University; PhD, 1996, Cornell University; capital markets/financial accounting.

Peecher, Mark E. 1993; MAS, 1989, PhD, 1994, University of Illinois; auditing and decision making.

Soderstrom, Naomi S. 1988; MS, 1985, PhD, 1990, Northwestern University; accounting information systems, managerial accounting, environmental accounting issues.

Senior Lecturers

Resler, William M. 1982; JD, 1972, University of Washington; LLM, 1973, New York University; tax accounting.

Rice, Steven J. 1985; MS, 1971, Oklahoma State University; PhD, 1974, University of Texas (Austin); tax accounting.

Lecturers

Britzmann, Jeannie R. 1995; MPAcc, 1994, University of Washington; tax accounting.

Creech, William R. 1992; LLM, 1983, New York University; taxation.

Wells, William L. 1988; MPAcc, 1989, University of Washington; financial reporting; not-for-profit accounting.

Finance and Business Economics

Finance and Business Economics address the financial and economic aspects of decision making. The Finance curriculum focuses on financial management and the financial markets within which firms and individual investors operate. Business Economics courses concern the economic behavior of firms, including factors that determine costs and prices, and the real and monetary forces (such as government policies) that affect the national and international economic environment.

Faculty

Chair

Lawrence D. Schall

Professors

Alberts, William * 1967, (Emeritus); PhD, 1961, University of Chicago; capital investment planning, business strategy, economics of industrial organization.

Bourque, Philip J. * 1957, (Emeritus); PhD, 1956, University of Pennsylvania; business economics.

Bradford, William D. 1994; MBA, 1968, PhD, 1972, Ohio State University; corporate finance, small and minority business, financial markets and institutions.

Conrad, Douglas A. * 1977, (Adjunct); MHA, 1973, University of Washington; MBA, 1977, PhD, 1978, University of Chicago.

Ferson, Wayne E. * 1992; PhD, 1982, Stanford University; financial economics and investments.

Frost, Peter A. * 1969; PhD, 1966, University of California (Los Angeles); investments, business finance, econometrics, monetary theory.

Haley, Charles * 1966; PhD, 1968, Stanford University; financial management of banks, business finance, international banking.

Hanson, Kermit O. 1948, (Emeritus); MS, 1940, PhD, 1950, Iowa State University; accounting and statistics.

Henning, Charles N. * 1948, (Emeritus); PhD, 1952, University of California (Los Angeles); finance and business economics.

Hess, Alan C. * 1967; PhD, 1969, Carnegie-Mellon University; banking, financial markets, microeconomics and macroeconomics.

Higgins, Robert C. * 1967; PhD, 1969, Stanford University; financial management, international financial management.

Johnson, Dudley * 1960, (Emeritus); PhD, 1957, Northwestern University; business economics.

Karpoff, Jonathan M. * 1983; PhD, 1982, University of California (Los Angeles); corporate finance, microeconomics, natural resources.

Roley, V. Vance * 1983; PhD, 1977, Harvard University; financial markets, finance, monetary theory, monetary policy.

Schall, Lawrence D. * 1968; PhD, 1969, University of Chicago; corporate finance, valuation, leasing, performance evaluation, acquisitions.

Siegel, Andrew F. * 1983; PhD, 1977, Stanford University; statistics, computing, corporate finance, investments.

Associate Professors

Kamara, Avraham * 1984; PhD, 1986, Columbia University; financial economics, investment, futures and options.

Malatesta, Paul H. * 1980; PhD, 1981, University of Rochester; corporate finance, security and capital markets, corporate mergers, and empirical methods in finance.

Pigott, William 1954, (Emeritus); MA, 1955, PhD, 1957, University of Washington; finance and business economics.

Rice, Edward M. * 1979; PhD, 1978, University of California (Los Angeles); corporate finance, microeconomics, industrial organization.

Assistant Professors

Dewenter, Kathryn L. 1992; PhD, 1993, University of Chicago; international finance, macroeconomics.

Koski, Jennifer Lynch 1991; MBA, 1987, Harvard University; PhD, 1991, Stanford University; corporate finance, market microstructure.

Novaes, Walter 1993; PhD, 1993, Massachusetts Institute of Technology; corporate finance, contract theory, industrial organization.

Pontiff, Jeffrey E. 1992; PhD, 1993, University of Rochester; corporate finance, capital market theory, closed-end mutual funds, investments.

Senior Lecturers

Hadjimichalakis, Karma G. 1982; MA, 1968, PhD, 1974, University of Rochester; monetary policy and domestic financial markets, macroeconomics.

Tarhouni, Ali A. 1985; MA, 1978, PhD, 1983, Michigan State University; economic theory, international trade and finance, financial markets.

Management and Organization

Management and Organization provides an understanding of the processes and structures of organizations through three distinct programs. The Human Resource Management and Organizational Behavior (HRMOB) courses address personnel and industrial relations topics such as selection, performance appraisal, compensation, and negotiations, as well as behavioral topics such as leadership, motivation, and group dynamics. They prepare students for managing an organization's human resources effectively. The Organization and Environment (OE) courses examine organization theory, organization design, and management of technology and innovation, as well as the social, political, legal, and ethical environments in which organizations operate. They give students the knowledge, perspective, and analytical tools to deal effectively with organization-environment interactions. The Business Policy (BPOL) courses focus on organizational effectiveness from the viewpoint of top management. Emphasis is placed on an integrated view through strategic management and control, planning, decision making, and entrepreneurship.

Faculty**Chair**

Cecil H. Bell, Jr.

Professors

Fenn, Margaret P. * 1950, (Emeritus); DBA, 1963, University of Washington; organizational behavior and administrative theory.

French, Wendell L. * 1958, (Emeritus); EdD, 1956, Harvard University; organizational behavior, human resources management, organization development.

Gist, Marilyn Elaine * 1987; PhD, 1985, University of Maryland; cognitive processes involved in motivation training and work task performance.

Henning, Dale A. * 1955, (Emeritus); PhD, 1954, University of Illinois; administrative theory and organizational behavior.

Hill, Charles William L. * 1988; PhD, 1983, University of Manchester (UK); business policy, corporate strategy, multinational enterprise.

Huber, Vandra Lee * 1987; DBA, 1982, Indiana University; human resource decision making, compensation, and performance appraisal.

Johnson, Richard A. * 1969, (Emeritus); DBA, 1958, University of Washington; business policy.

Jones, Thomas M. * 1977; PhD, 1977, University of California (Berkeley); ethics, business, government and society.

Kast, Fremont E. * 1978, (Emeritus); DBA, 1956, University of Washington; administrative theory and organizational behavior.

Knudson, Harry R. * 1961; DBA, 1958, Harvard University; business policy.

Le Breton, Preston P. * 1960, (Emeritus); PhD, 1953, University of Illinois; business policy and administrative theory.

Mitchell, Terence R. * 1969; PhD, 1969, University of Illinois; organizational behavior.

Newell, William T. * 1963; PhD, 1962, University of Texas (Austin); operations management and business policy.

Peterson, Richard B. * 1971; PhD, 1966, University of Wisconsin; human resources management.

Rosenzweig, Jim E. * 1956, (Emeritus); PhD, 1956, University of Illinois; administrative theory and organizational behavior.

Saxberg, Borje O. * 1957; PhD, 1958, University of Illinois; administrative theory and organizational behavior.

Schrieber, Albert N. * 1948, (Emeritus); MBA, 1947, Harvard University; MD, 1974, Columbia University; business policy.

Scott, William George * 1966, (Emeritus); DBA, 1957, Indiana University; administrative theory and organizational behavior.

Sutermeyer, Robert A. 1949, (Emeritus); MA, 1942, University of Washington; personnel and organizational behavior.

Vesper, Karl H. * 1969; PhD, 1969, Stanford University; business policy, mechanical engineering, marine studies.

Wheeler, Bayard O. 1948, (Emeritus); MA, 1930, University of Washington; PhD, 1942, University of California (Berkeley); urban economics.

Associate Professors

Beard, Donald W. * 1975; MBA, 1961, Harvard University; PhD, 1975, University of Nebraska; business policy.

Bell, Cecil H. Jr. * 1968; MA, 1959, PhD, 1970, Boston University; organizational behavior and administrative theory.

Buck, Vernon E. * 1968; PhD, 1963, Cornell University; organizational behavior and administrative theory.

Butler, John E. * 1985; PhD, 1985, New York University; entrepreneurship, technology and innovation, strategic management.

Hansen, Gary S. * 1984; PhD, 1987, University of Michigan; business and corporate strategy, innovation and entrepreneurship.

Kienast, Philip K. * 1970; PhD, 1972, Michigan State University; human resources management.

Lee, Thomas W. * 1983; PhD, 1984, University of Oregon; administrative theory and organizational behavior, human resources management.

Moxon, Richard W. * 1971; DBA, 1973, Harvard University; international business.

Strong, Dennis Fulton * 1967, (Emeritus); PhD, 1959, University of Washington; business history.

Wickman, James A. * 1953, (Emeritus); DBA, 1961, University of Washington; risk control and insurance.

Woodworth, Robert T. * 1966; PhD, 1963, Northwestern University; administrative theory and organizational behavior, human resources management.

Assistant Professors

Collins, Paul D. * 1990; PhD, 1986, Rutgers University; organizational theory, technological innovation, and organizational change.

Fuller, Sally R. 1992; PhD, 1993, University of Wisconsin; organizational behavior and organizational theory.

Schulz, Martin 1993; PhD, 1993, Stanford University; organizations, qualitative and quantitative methods.

Wicks, Andrew C. 1992; PhD, 1992, University of Virginia; business ethics, corporate and social responsibility.

Lecturer

Berger, Robert H. 1985; JD, 1967, MBA, 1983, University of California (Berkeley); law.

Management Science

The Department of Management Science consists of three subareas: Information Systems (IS), Operations Management (OPMGT), and Quantitative Methods (QMETH). The Information Systems area focuses on the management of computer-based information systems. The IS curriculum is designed to give students a basic understanding of IS technology and its impact on all phases of an organization. Specific areas of study include telecommunications and network design, systems analysis and design, database management, and applications programming. The Operations Management (OPMGT) area of study refers to the functional area of management which produces goods or services in an organization. Specifically, the OPMGT curriculum focuses on the many changes which have occurred in the past ten years in the way that managers think, plan, and operate manufacturing and service facilities. The area includes courses in logistics, quality, inventory and material management, project management, and waiting lines, among others. The Quantitative Methods (QMETH) area focuses on the theory and application of mathematical and statistical tools in the modeling and analysis of business problems. The QMETH curriculum includes courses in statistics and data analysis as well as courses in operations research (e.g., linear programming, forecasting, using spreadsheets to construct decision support models).

Faculty**Chair**

Theodore Klastorin

Professors

Chiu, John S. Y. * 1960, (Emeritus); PhD, 1960, University of Illinois; business statistics.

Faaland, Bruce H. * 1971; PhD, 1971, Stanford University; manufacturing, scheduling, inventory, operations research, mathematical programming, forestry.

Klastorin, Theodore * 1974; PhD, 1973, University of Texas (Austin); operations management, facility location, project management, waiting lines, logistics, inventory.

Moinzadeh, Kamran * 1984; MS, 1982, PhD, 1984, Stanford University; operations management, production management, inventory, quality and supply chain management.

Siegel, Andrew F. * 1983; PhD, 1977, Stanford University; statistics, computing, corporate finance, investments.

Tamura, Hirokuni * 1967; PhD, 1967, University of Michigan; strategic use of statistics for quality management, use of expert information in auditing.

Associate Professors

Jones, Christopher V. * 1995; MEng, 1981, MS, 1983, PhD, 1985, Cornell University; quantitative methods and information systems.

Prater, George I. * 1965; PhD, 1963, Stanford University; information systems.

Schmitt, Thomas G. * 1979; DBA, 1979, Indiana University; management of service and manufacturing operations.

Assistant Professors

De Croix, Gregory A. 1991; PhD, 1992, Stanford University; quantitative methods, environmental management, operations management.

Hillier, Mark S. 1993; PhD, 1994, Stanford University; operations management.

Langford, Joseph D. * 1988; PhD, 1990, University of Rochester; modeling of stochastic phenomena in information systems.

Mannino, Michael V. * 1991; PhD, 1983, University of Arizona; database management, automated reasoning, object-oriented modeling.

Mookerjee, Vijay * 1991; PhD, 1991, Purdue University; information systems.

Senior Lecturers

Burrows, William E. 1968; MA, 1971, MBA, 1972, University of Washington; information systems.

Morita, June G. * 1982; PhD, 1985, University of California (Berkeley); survey design/implementation, quality control, survival analysis, statistical data analysis.

Pilcher, Martha G. * 1987; PhD, 1985, Georgia Institute of Technology; operations research/operations management, health care applications and logistics.

Marketing and International Business

Marketing provides knowledge of concepts and relationships in the areas of consumer behavior, channels of distribution, measurement and analysis of markets, pricing, physical movement of goods, product development, promotion, and sales administration. Marketing careers may involve specialization in product or brand management, advertising, selling, sales management, marketing research, retailing, wholesaling, and international marketing for a wide spectrum of firms and industries. International Business includes trade, payments, and multinational corporate systems and activities. The area prepares students for international responsibilities in domestic business firms, governmental agencies, and overseas business. Courses in Business Communications stress writing in organi-

zations to accomplish goals, oral reporting, business plan presentation, and the use of computer graphics in communication.

Faculty

Chair

Robert L. Jacobson

Professors

Erickson, Gary * 1980; MBA, 1973, PhD, 1978, Stanford University; quantitative models of marketing and analysis of competitive strategies.

Gautschi, David A. * 1992; MBA, 1974, University of Oregon; PhD, 1979, University of California (Berkeley); marketing management, marketing strategies in the global information telecommunications industries.

Gordon, Guy G. 1957, (Emeritus); MBA, 1950, University of Washington; PhD, 1957, University of California (Berkeley); marketing.

Harder, Virgil E. * 1955, (Emeritus); PhD, 1958, University of Illinois; business communications.

Ingene, Charles A. * 1982; MA, 1972, PhD, 1975, Brown University; retailing and distribution strategy and marketing management.

Jacobson, Robert L. * 1984; PhD, 1981, University of California (Berkeley); marketing strategy, marketing management and entrepreneurial management.

Kolde, Endel-Jakob * 1951, (Emeritus); DBA, 1954, University of Washington; international business and marketing.

MacLachlan, Douglas * 1970; MBA, 1965, MA, 1970, PhD, 1971, University of California (Berkeley); marketing research, sales forecasting, psychological measurement and statistics.

Moinpour, Reza * 1966; MBA, 1966, PhD, 1970, Ohio State University; consumer decision making, new product development and marketing research.

Murphy, Herta 1946, (Emeritus); MA, 1942, University of Washington; international business.

Narver, John C. * 1966; MBA, 1960, PhD, 1965, University of California (Berkeley); market strategy, market-driven organization, pricing policies, marketing management.

Spratlen, Thaddeus H. * 1972; MA, 1957, PhD, 1962, Ohio State University; retailing, marketing management, marketing and the city.

Sullivan, Jeremiah J. * 1975; MA, 1967, PhD, 1970, New York University; MBA, 1975, University of Washington; international business, Japanese management.

Wheatley, John J. * 1960; MBA, 1954, PhD, 1959, State University of New York (Buffalo); marketing management, marketing research, sales management.

Yalch, Richard F. * 1971; MS, 1970, Carnegie-Mellon University; PhD, 1974, Northwestern University; advertising management and consumer behavior, marketing management, marketing research.

Yamamura, Kozo * 1972, (Adjunct); PhD, 1964, Northwestern University; economic development and economic history of Japan, comparative economic history.

Associate Professor

Grathwohl, Harrison L. * 1958, (Emeritus); DBA, 1957, Indiana University; marketing.

Assistant Professors

Louie, Therese A. 1993; PhD, 1992, University of California (Los Angeles); consumer behavior, social cognition, motivational biases.

Ruth, Julie A. 1991; MA, 1987, University of Texas (Austin); PhD, 1991, University of Michigan; emotions and consumer behavior, advertising management, consumer marketing.

Simonin, Bernard L. 1991; MBA, 1986, Kent State University; PhD, 1991, University of Michigan; international marketing, multinational business management and strategic alliances.

Lecturer

Edwards, Judith A. 1988; MBA, 1979, University of Washington; marketing and personal selling.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Accounting

Courses for Undergraduates

ACCTG 199 Accounting Problem Solving (2, max. 6) Supplementary lectures, discussion, and problem solving sessions in introductory accounting. Enrollment restricted to EOP students and others by permission of instructor. Credit may not be applied to fulfill specific course requirements or to 180 credits required for graduation. Credit/no credit only. Concurrent enrollment in 210, 220, or 230 required.

ACCTG 215 Introduction to Accounting and Financial Reporting (5) Nature and social setting of accounting; uses of accounting information; introduction of basic accounting concepts and procedures; interpretation of financial statements. Prerequisite: sophomore standing.

ACCTG 225 Fundamentals of Managerial Accounting (4) Analysis and evaluation of accounting information as part of the managerial process of planning, decision making, and control. Concentrates on information useful to enterprise managers. Prerequisite: 215.

ACCTG 301, 302, 303 Intermediate Accounting I, II, III (3, 3, 3) Concepts and principles of financial accounting. Analysis of controversies and problems related to the measurement of enterprise income and asset and liability valuation. Prerequisites: 230 and admission to accounting major for 301; 301 for 302; 302 for 303.

ACCTG 311 Cost Accounting (3) Introduction to the theory of cost accounting; job order, process, and standard cost systems; overhead accounting; problems in accumulation and allocation of costs; decision making with cost data. Prerequisite: 301.

ACCTG 330 Introduction to Accounting Information Systems (3) Concepts of accounting information systems in organizations. Processes of analyzing and designing accounting information systems, with emphasis on those using computer facilities. Internal controls and auditing considerations. Prerequisites: 302 and IS 300.

ACCTG 371 Auditing or Industrial Internship (2) One quarter's internship with a certified public accounting firm, industrial organization, or government agency. Credit/no credit only. Prerequisite: prior departmental approval.

ACCTG 375 Topics in Financial Reporting (4) Critical examination of the uses and limitations of general purpose financial statements that have been prepared in accordance with generally accepted accounting principles. Not open for credit to accounting majors or to students who have completed 301. Prerequisite: 230.

ACCTG 401 Federal Income Tax Factors in Business Decisions (3) Service course in taxation recommended for the junior year for non-accounting majors. May also be taken by MBA students for graduate credit. Not open to accounting majors. Prerequisite: 230.

ACCTG 411 Auditing Standards and Principles (3) Intensive introduction to the attest function in society today. The environment, the process, and the report of the public auditor are analyzed. Potential extensions of the attest function are examined. Prerequisites: 303, 311, 330.

ACCTG 421 Tax Effects of Business Decisions (3) Issues in taxation, including tax considerations in business decision making, tax effects of business transactions, taxation of compensation, fringe benefits, capital gains, fixed asset transactions, disposition of business distribution from corporations. Prerequisite: 303 or permission of undergraduate office.

ACCTG 450 Business Taxation (3) Issues of taxation for entities other than individuals, including corporations, subchapter S corporations, partnerships, estates, and trusts. Includes corporate distributions, liquidations, and reorganizations. Prerequisite: 421.

ACCTG 451 Individual Income Taxation (3) Political, economic, and social forces influencing federal income taxation, role of taxation in personal decisions. Coverage of individual income tax matters, including business and investment income, business and personal deductions, property transactions, and tax issues of employees. Prerequisite: 421.

ACCTG 460 Advanced Cost Accounting (3) Advanced analysis of cost and management accounting problems; special applications of cost accounting techniques for management planning and control; current developments in cost accounting. Prerequisite: 311.

ACCTG 470 Case Studies in Auditing (3) Application of the theory, standards, and principles to a simulated audit engagement. Guest lecturers discuss the broad-ranging audit involvement. Prerequisite: 411.

ACCTG 471 Internal Auditing (3) Independent appraisal function established within an organization. Role and nature of internal auditing; intensive review of internal control; management effectiveness audits; and financial audits from the point of view of the internal auditor. Prerequisite: 411.

ACCTG 480 Accounting for Not-for-Profit Organizations (3) Fund and budgetary accounting as applied to public sector organizations, such as governments, foundations, hospitals, and colleges. Prerequisite: 303.

ACCTG 485 Advanced Financial Accounting (3) Accounting for partnerships, accounting for business combinations, parent-subsidiary and branch relationships, foreign exchange. Prerequisite: 303.

ACCTG 490 Special Topics in Accounting (1-6) Special topics of current concern to faculty and students. Offered only when faculty is available and student interest is sufficient. Class is announced in advance of scheduled offerings.

ACCTG 495 Advanced Accounting Theory (3) Theory of accounting related to income measurement, assets, and equities. Prerequisites: 303 and senior standing.

ACCTG 499 Undergraduate Research (1-6, max. 9) Arranged and supervised by individual members of the faculty. Prerequisite: permission of undergraduate office.

Courses for Graduates Only

Approval of graduate business program office required. Entry code required for nonmajors.

ACCTG 503 Introduction to Accounting for Managers (4) Noreen, Sundem Provides potential managers with a basic knowledge of financial and managerial accounting. Focuses on the use, not the preparation, of accounting information. Examples presented for a variety of for-profit and nonprofit organizations.

ACCTG 505 Intensive Analysis of Accounting Principles and Practices (18) Covers the subjects in the required core for undergraduate accounting majors: intermediate accounting, advanced accounting, cost accounting, auditing, and tax accounting. Credits will not count toward MBA degree. Prerequisites: 210, 220, 230 or equivalent, or permission of instructor.

ACCTG 510 Problems in Financial Reporting (4) Extension of 500 emphasizing financial reporting from a user's perspective. Alternative approaches to recognition, valuation, and measurement of assets, equities, and income considered. Choice of accounting methods and effects on the firm of accounting policy regulation also examined. Prerequisites: BA 502 or permission of instructor.

ACCTG 511 Problems in Managerial and Cost Accounting (4) Discussion and analysis of costing techniques, use of accounting data in planning and evaluating managerial performance, and use of accounting data in short-run and long-run decisions. Special attention directed to issues in human behavior involved in cost allocation, budgeting, and performance evaluation. Prerequisites: BA 502 or permission of instructor.

ACCTG 513 Tax Effects of Business Decisions (4) Importance of tax considerations in making business decisions. Relationship of taxable income to accounting and economic concepts of income, and the economic, political, and social background of important tax provisions. Prerequisite: BA 502 or permission of instructor.

ACCTG 520 Seminar in Financial Statement Analysis (4) Emphasizes use of published financial reports by decision makers external to the firm (e.g., investors, creditors). Within each decision context, traditional models and recent empirical research in accounting and finance are discussed. Project required as an application of course subject matter. Prerequisites: BA 502 or permission of instructor.

ACCTG 524 Seminar in International Accounting (4) Introduction to the conceptual, managerial, professional, and institutional issues of international accounting. Comparative and empirical studies receive special attention. Current interest topics (e.g., standard setting and transnational financial reporting) are explored. A research paper required. Prerequisites: BA 502 or permission of instructor.

ACCTG 530 Tax Issues in Property Ownership (4) Analysis of gain and loss realization, recognition, and characterization of such. Detailed exploration of statutory and case law regarding acquisition, ownership, and disposition of assets. Treatment of capital and ordinary gains and losses. Timing issues regarding deferral transactions and installment reporting are analyzed. Prerequisite: undergraduate accounting concentration or equivalent.

ACCTG 531 Timing and Periods of Taxation (3) Analysis of the cash and accrual methods of accounting, choice of taxable period and multi-period transaction analysis. Consideration of statute of limitations and mitigation thereof. Details of passive activity losses. Prerequisite: undergraduate accounting concentration or equivalent.

ACCTG 533 Procedural and Policy Issues (3) Analysis of the procedures of Federal taxation: assessment, collection, and refund claims. Detailed exploration of the rules governing the statute of limitations and the mitigation thereof. An introduction to tax policy considerations is given. Tax penalties are explored. Prerequisite: undergraduate accounting concentration or equivalent.

ACCTG 534 Fundamentals of Corporate Taxation (3) Detailed analysis of contribution of assets to corporations. Calculation of recognized gains and basic effects of asset contributions. Treatment of income and deduction items of corporate operations. Analysis of distribution of assets to shareholders with respect to their stock. Prerequisite: undergraduate accounting concentration or equivalent.

ACCTG 535 Advanced Issues in Corporate Taxation (3) A continuation of 534. Fundamentals of moving assets out of and within corporate solution. Basics of corporate reorganizations: acquisitive and divisive. The details of the election to obtain (or avoid) the Section 338 election are explored in detail. Prerequisite: Undergraduate accounting concentration or equivalent; 534 or permission of instructor.

ACCTG 536 Advanced Issues in Corporate Taxation (3) Continuation of 534 and 535. Study of complex issues in corporate taxation planning. Substantial portion of course involves resolving case studies to improve analytic skills and to interrelate disparate corporate planning opportunities. Corporate reorganizations are analyzed in detail. Prerequisite: undergraduate accounting concentration or equivalent; 535 or permission of instructor.

ACCTG 538 Income Taxation of Conduits II (3) A continuation of 537. Study of complex issues in partnership and S corporation taxation. Substantial portion involves resolving case studies to improve analytic skills and interrelate partnership and S corporation planning issues. Sections 751(b) and 736 examined in detail. Prerequisite: undergraduate accounting concentration or equivalent; 537 or permission of instructor.

ACCTG 543 Income Taxation of Trusts and Estates (3) Development of fundamental skills regarding income taxation of trusts and estates. Calculation of distributable net income and the distribution deduction for the fiduciary entity. Basic analysis of the throwback rules. Case studies. Prerequisite: undergraduate accounting concentration or equivalent.

ACCTG 547 Estate and Gift Taxation (3) Development of fundamental knowledge of the unified transfer tax on the transfer of property from one person to another. Calculation of gross estate, adjusted gross estate, and taxable estate. Calculation of gift and estate taxes owing. Discussion of estate planning concepts. Prerequisite: undergraduate accounting concentration or equivalent.

ACCTG 550 Communications in Professional Accounting (4) Introduction to the communications forms and to practices professional accountants and accounting managers. Development of effective written and oral skills employed in accounting presentations, such as audit reports and consultants' reports. Study of results of organizational communications research applicable to accounting firms and/or units within firms. Prerequisite: undergraduate accounting concentration or permission of instructor.

ACCTG 551 Management Information Systems (4) Develops the professional accountant's responsibilities in designing and operating management information systems with an emphasis on accounting systems. Data organization and management, effects on accounting functions, responsibilities for controls and security, and planning and acquisition of system resources. Prerequisites: 330, IS 320 and BA 501 or equivalent.

ACCTG 555 Statistical Methods in Professional Auditing (4) Comparative analysis of the methods of statistical inference used in auditing and incorporation of these methods in the auditor's decision processes. Prerequisite: undergraduate accounting concentration or equivalent.

ACCTG 557 Tax Consulting, Planning, and Research (4) Decision-making processes in relation to problems of taxation. Tools of tax analysis and re-

search and the communication of conclusions flowing from professional tax work. Role of the professional accountant in client business transactions and in negotiations with taxing authorities is highlighted and simulated on the basis of actual case histories. Prerequisite: undergraduate accounting concentration or equivalent.

ACCTG 558 Current Financial Accounting and Reporting Issues (4) Develops professional-level ability to understand, analyze, and report upon selected political, economic, social, and legal dimensions of current financial accounting and reporting issues. Issues vary each year. Prerequisite: undergraduate accounting concentration or equivalent.

ACCTG 559 Advanced Auditing Problems and Cases (4) Analysis of current developments in auditing and comprehensive case studies. Designed to extend knowledge of audit decision making and advanced techniques. Topics covered vary depending upon current issues facing professional auditors. Prerequisite: undergraduate accounting concentration or equivalent.

ACCTG 560 Special Topics In Professional Accounting (4) Lectures, discussion, and case analyses dealing with special current topics relevant to professional accounting. Satisfies the professional accounting elective requirement for the M.P.Acc. degree program. Prerequisite: permission of instructor.

ACCTG 579 Special Topics In Accounting (4, max. 12) Accounting topics of current concern to faculty and students. Offered only when faculty are available and sufficient student interest exists. Seminar content announced in advance of scheduled offering. Prerequisite: permission of instructor.

ACCTG 580 Introduction to Accounting Research (4) Examination of research problems and techniques in accounting. Interdisciplinary nature of accounting research emphasized. Work in finance, economics, and psychology used to develop current trends in accounting research. Prerequisite: doctoral student status.

ACCTG 581 Seminar In Managerial Accounting (4) Critical examination of conceptual and practical issues of cost and managerial accounting. Specific topics may change from quarter to quarter, and they include application of behavioral, quantitative, and economic models to managerial accounting problems. Prerequisite: 511 or permission of instructor.

ACCTG 586 Seminar In Financial Accounting Research (4) Review and critical analysis of research strategies and methods applied to problems in financial reporting practice and financial accounting standard setting. Prerequisite: doctoral student status and 580 or equivalent or permission of graduate office.

ACCTG 597 Seminar In Managerial Accounting Research (4) Critical analysis of current managerial accounting research, both published and unpublished. Prerequisite: doctoral student status and 581 or equivalent or permission of graduate office.

ACCTG 599 Doctoral Seminar In Accounting (1, max. 12) Study and research in advanced topics of Accounting. The seminar is generally concerned with unpublished areas of research as well as research methodology and philosophy. It is conducted by departmental faculty and occasional distinguished visiting faculty. Prerequisite: doctoral student status.

ACCTG 600 Independent Study or Research (1, max. 9)

Administration

Courses for Graduates Only

Approval of graduate business program office required. Entry code required.

ADMIN 510 Integrative Administration (15) *LeBreton* Includes materials basic to the study and analysis of administration in organizations; organization theory and administrative behavior; human resources management; resource allocation, accounting, and financial control, systems operation and analysis; marketing; governmental-societal framework; policy formulation and strategic planning. Faculty team-teaching approach. Not open to business administration majors. Credit/no credit only. Prerequisite: permission of Graduate School of Business Administration.

Business Administration

Courses for Undergraduates

B A 300 Foreign Study-Business Administration (3-5, max. 15) For participants in approved foreign-study programs where equivalent UW business administration courses are not available. Prerequisite: permission of undergraduate adviser.

B A 371 Cooperative Education In Business (2, max. 6) Business practicum: one or two quarter internship with approved business or governmental agency. Open only to students who meet requirements of internship program. Internship credit may not be applied to fulfill specific course requirements or to 180 credits required for graduation. Credit/no credit only.

Courses for Graduates Only

Approval of the graduate business program office required. Entry code required.

B A 500, 501, 502 Business Administration I, II, III (16, 16, 16) Coordinated series consisting of accounting, business economics, business ethics, business policy, finance, information systems, international business, legal environment of business, management, and organizational behavior, marketing, operations management, and quantitative methods for management. Prerequisite: permission of the School of Business Administration.

B A 541 Environmental Management I (4) Survey of environmental ethics, environmental laws and regulation, the economics of environmental decisions, and the relationship of business to public policy and the environment. Must be taken concurrently with B A 544. Prerequisites: permission of instructor.

B A 542 Environmental Management II (4) Applications of the functional areas of business to environmental concerns. Major federal legislation affecting these concerns applied to business problems in the areas of accounting, finance, marketing, management information systems, and organizational behavior. Must be taken concurrently with 544. Prerequisites: 541 or permission of instructor.

B A 543 Environmental Management III (4) Case studies that integrate the fundamentals of business and environmental management to address such issues as plant siting, regulatory compliance, production line changes, and innovative, proactive responses to environmental issues. Case studies include results of student consulting projects. Must be taken concurrently with 544. Prerequisites: 542 or permission of instructor.

B A 544 Environmental Management Seminar (1, max. 3) Guest lecturers from academia, business, government, and advocacy groups discuss environmental science, ethics, law, regulation, economics, finance, accounting, and policy issues. Seminar topics supplement course material in 541, 542, 543 which are to be taken concurrently.

BA 571-572 Research Reports (4-4) Independent study in business administration; critical evaluation of business analysis and research methods. Effective communication of ideas emphasized. Methods and

content of independent research studies subjected to critical evaluation. Open only to MBA nonthesis students. Prerequisites: instructor's approval of preliminary research topic outline for 571; 571 for 572.

B A 700 Masters Thesis (*) B A 800 Doctoral Dissertation (*, max. 9)

Business Administration Research Methods

Courses for Graduates Only

Approval of the graduate business program office required. Entry code required for nonmajors.

BA RM 580 Applied Econometrics I (4) Emphasizes the application of econometric methods rather than the mathematical proofs of statistical procedures. Introduction to the linear regression model, interpretation of summary statistics, bias and precision of regression estimates, analysis of the residuals. Prerequisites: STAT 342, or 395, or 481, or permission of instructor.

BA RM 581 Applied Econometrics II (4) Continuation of 580. Hypothesis testing, distributed lags, serial correlation models, simultaneous equation models. Prerequisite: 580.

BA RM 590 Behavioral Research Methods—Theory and Design (4) Philosophy of science, development of scientific method, and meaning of behavioral research. Historical perspective of scientific investigation and the evaluation of research. The development of theory and its relationship to research. Various strategies and designs in behavioral research. Prerequisites: STAT 361, 362, or permission of instructor.

BA RM 591 Behavioral Research Methods—Approaches and Applications (4) Considers alternative research approaches, such as laboratory and field experimentation, simulation, and surveys, with data-gathering techniques appropriate for each approach. It is primarily concerned with developing alternative approaches to research problems and with discussing specific applications. It builds upon a background of specific statistical tools and techniques and an understanding of theory development and research design. Prerequisites: STAT 361, 362, or permission of instructor.

Business Communications

Courses for Undergraduates

B CMU 301 Basic Written Business Communications (4) Broad analytical approach to written communications as a management tool. Analysis of the psychology, semantics, planning, and principles of effective business writing. Practical application through messages that inform and persuade, grant and refuse; plus short business reports and applications for positions. Prerequisite: junior standing.

B CMU 410 Business Reports and Other Specialized Communications (4) Covers both internal and external communications that businessmen and businesswomen write on the job. Emphasis on various types of internal reports, ranging from short informal memos to the more complex formal reports. Also covered are specialized external types of communications directed to customers. Prerequisite: 301 or equivalent and junior standing.

B CMU 499 Research in Business Communications (1-6) Prerequisite: 301 or equivalent and permission of instructor.

Courses for Graduates Only

BCMUS10 Business Communications for Managers (4) Seeks to develop understanding of communications and related theories, to describe strategies for planning managerial communications, and to build skills in oral and written reporting and persuading. Prerequisite: approval of graduate business office.

Business Economics

Courses for Undergraduates

B ECON 300 Managerial Economics (3) Analysis of economic factors affecting decisions made by business firms. Demand and cost analysis, and alternative policies from the firm's point of view. Prerequisites: ECON 200, admission to business administration or permission of undergraduate office.

B ECON 301 Intermediate Macroeconomics (4) Analysis of economy including business cycle, output of goods and services (GNP), inflation, unemployment, and government's fiscal and monetary policies. How the economy affects individuals and firms and how to deal effectively with economic environment. Prerequisites: ECON 200 and 201 and admission to business administration or permission of undergraduate office.

B ECON 420 Financial Markets (4) Analysis of the structure and functions of the money and capital markets; the saving-investment process and financial intermediaries; supply and demand for lendable funds and the level and structure of interest rates, role of Federal Reserve and Treasury in money market developments. Prerequisite: 301.

B ECON 427 International Finance (4) Asset choice and institutional operations in international finance; foreign-exchange problems; the impact of international financial problems and operations on business; short- and long-term international financing. Prerequisite: 301.

B ECON 439 Business Forecasting (4) Analysis of basic variations affecting general business conditions as a background for business and investment decisions; appraisal of proposals for controlling cycles and of forecasting techniques. Prerequisites: 301, QMETH 201.

B ECON 490 Special Topics in Business Economics (1-6) Study and research on topics of current concern to faculty and students. Only offered when allowed by faculty availability and sufficient student interest. Seminar content to be announced in advance of scheduled offerings.

B ECON 499 Undergraduate Research (1-6) Research in selected areas of business economics. Prerequisites: 300, 301, permission of undergraduate office.

Courses for Graduates Only

Approval of the graduate business program office required. Entry code required for nonmajors.

B ECON 520 Financial Markets (4) Analysis of the functions and structure of money markets; the saving-investment process and financial intermediaries; supply and demand for lendable funds and the level and structure of interest rates, role of the Federal Reserve and Treasury in the money markets. Prerequisite: B A 501.

B ECON 527 International Finance and Investments (4) Study of selected problems in financing, international trade, investment, and foreign business operations; international aspects of money markets; problems of evaluation of foreign investments. Prerequisites: B A 502, FIN 502.

B ECON 528 International Financial Management (4) Analysis of financial problems facing businesses

engaged in international activities: financing foreign investment, financial control of foreign operations, and working capital management including foreign-exchange positions using cases and readings.

B ECON 579 Special Topics in Business Economics (4, max. 12) Business economics topics of current concern to faculty and students. Offered only when faculty are available and sufficient student interest exists. Seminar content announced in advance of scheduled offering. Prerequisite: permission of instructor.

B ECON 600 Independent Study or Research (*, max. 9)

Business Policy

Courses for Undergraduates

B POL 470 Business Policy (4) Policy making and administration from a general management point of view. Emphasis is on problem analysis, the decision-making process, administration and control, and continuous reappraisal of policies and objectives. This course integrates and builds upon the work of the core curriculum. Prerequisites: admission to business administration, senior standing, and FIN 350, MKTG 301, OPMGT 301, and HRMOB 400, or permission of undergraduate office.

B POL 471 Small Business Management (4) Policy formulation and implementation in smaller firms from the top manager's point of view. Integrates and builds upon work of the core curriculum. Includes analysis of cases and field projects related to small firms. Prerequisites: admission to business administration, senior standing, and FIN 350, MKTG 301, OPMGT 301, and HRMOB 400, or permission of undergraduate office.

B POL 472 Starting, Developing, and Managing a New Business (4) Focus on process of starting a new business venture. Topics include the entrepreneurial process, idea generation, developing and using a business plan, and buying a going business. Students develop ideas and a case based on the experience of a local entrepreneur.

B POL 473 Practicum in Entrepreneurship (4) Explores requirements and challenges in establishing a business in the State of Washington. Broad areas of interest include developing business concepts, marshalling resources, startup actions, and strategic and operation planning.

B POL 480 Business Simulation (5) Critical analysis of integrated business policy formulation in a complex and dynamic industrial environment by means of simulation (business gaming). Prerequisites: admission to business administration, senior standing, and FIN 350, MKTG 301, OPMGT 301, and HRMOB 400, or permission of undergraduate office.

B POL 490 Special Topics in Business Policy (1-6) Study and research topics of current interest to faculty and students. Offered only when faculty is available and student interest is sufficient. Class is announced in advance of scheduled offerings.

B POL 499 Undergraduate Research (1-6, max. 9) Prerequisite: permission of undergraduate office.

Courses for Graduates Only

Approval of the graduate business program office required. Entry code required for nonmajors.

B POL 530 Entrepreneurship (4) Entrepreneurship, both in the form of (1) establishment of new independent businesses owned largely by those who manage them and (2) initiation of new enterprises having exceptional autonomy within larger organizations that finance and own them. Basic knowledge in accounting, marketing, and finance is assumed.

B POL 555 Entrepreneurial Marketing and Management (4) Focuses on role of managers in fostering profitable growth and entrepreneurial actions within ongoing organizations. Class sessions utilize current analytical and conceptual methods, case and field studies, management development exercises, and *Foodcorp, Inc.* which allows students to simulate management of multinational corporations. Prerequisite: B A 501. Offered: jointly with MKTG 555.

B POL 570 Strategic Planning Systems (4) Formal institutional procedures for involving the entire organization in strategic planning and quantitative methods for doing such planning. These are applied to analyzing strategy and firm performance, predicting long-range industry and national environments, formulating corporate-level and business-level strategies, and integrating planning models into the planning process. Prerequisites: B A 502 or permission of graduate office.

B POL 575 Strategic Decision Making (4) Focuses on (1) role of strategic leadership in the success of organizations, (2) conceptual-logical methods for doing strategic planning, (3) organization-wide experience methods for formulating policies, and (4) decision methods for use within the strategic coalition. Prerequisites: B A 502 or permission of graduate office.

B POL 579 Special Topics in Business Policy (4, max. 12) Study and research in topics of current concern to faculty and students. Offered only when allowed by faculty availability and sufficient student interest. Seminar content announced in advance of scheduled offering.

B POL 599 Doctoral Seminar in Business Policy (1, max. 12) **B POL 600 Independent Study or Research (*, max. 9)**

Finance

Courses for Undergraduates

FIN 350 Business Finance (4) Sources, uses, cost, and control of funds in business enterprises. Internal management of working capital and income sources and cost of long-term funds; capital budgeting; financing of the growth and expansion of business enterprises; government regulation of the financial process. Prerequisites: B ECON 300 and admission to business administration or permission of undergraduate office.

FIN 423 Banking and the Financial System (4) Role of banks and nonbank financial institutions in the financial system; asset choices of banks and nonbank financial institutions; problems in the management of financial institutions with emphasis on commercial banks. Prerequisites: 350, B ECON 420.

FIN 450 Problems in Corporate Finance (4) Case problems in corporate financial management. Includes cases on management of current assets, obtaining short-term loans, raising long-term capital, capital budgeting, and dividend policy. The management point of view is stressed. Prerequisites: 350, ACCTG 375.

FIN 453 Financial Theory and Analysis (4) Business financial strategic planning. Topics include business valuation and financing, performance evaluation, risk analysis, capital budgeting, and inflation and taxes. Emphasizes tools with real-world applications while incorporating modern finance concepts. Prerequisites: 350, QMETH 201.

FIN 480 Investments (4) Introduction to the nature, problems, and process of evaluating particular securities and portfolio construction and administration. Special attention is directed to the risk and rate-of-return aspects of particular securities portfolios, and total wealth. Prerequisites: 350, senior standing.

FIN 481 Financial Futures and Options Markets (4) Introduction to financial futures and options mar-

kets. Instructional aspects and social functions of these markets, pricing of options and futures, and risk shifting by hedging. Prerequisite: 460.

FIN 490 Special Topics in Finance (1-6) Study and research topics of current concern to faculty and students. Only offered when faculty availability and sufficient student interest. Seminar content to be announced in advance of scheduled offerings. Prerequisite: permission of instructor.

FIN 499 Undergraduate Research (1-6) Research in selected areas of business finance, money and banking, or investments. Prerequisites: 350, permission of undergraduate office.

Courses for Graduates Only

Approval of the graduate business program office required. Entry code required for nonmajors.

FIN 530 Financial Management of Banks (4) Analysis of problems in the financial management of commercial banks and other financial institutions. Loan and investment policies, liability management, capital policies, and other selected issues are discussed. Prerequisite: B ECON 520 or permission of graduate office.

FIN 550 Advanced Business Finance (4) Systematic coverage of the theory of financial management. Application of quantitative analysis to financial problems of the firm, including the investment and financial decisions, lease analysis. Prerequisite: B A 502.

FIN 551 Problems in Business Finance (4) The application of financial principles and techniques to problems in financial management. Topics include cash management, credit management, problems in short- and long-term financing, and capital budgeting. Prerequisite: B A 502.

FIN 552 Corporate Planning and Financing (4) Addresses management of working capital flows and finance operations. Topics include financial statement analysis, *pro forma* forecasting, case budgeting, sources of financing including bank, venture capital, private placements, and leases, and determinants of company financing policy. Cannot be taken for credit in combination with FIN 551. Prerequisite: B A 502.

FIN 553 Capital Investment Planning (4) Case discussions used to examine corporate resource allocation decisions. Topics include capital budgeting techniques, estimation of capital costs, capital budgeting systems, strategic investment decisions, and financial restructurings. Prerequisite: 552.

FIN 555 Corporate Financing Decisions (4) Framework for analyzing the effects of non-investment decisions on corporate value. Topics include financing policy, compensation policy, hedging, leasing, and dividend policy. Focus on the role of financial contracting. Prerequisite: B A 502.

FIN 556 Investment Planning and Evaluation (4) Analytic tools for valuing and evaluating business entities and for investment planning. Topics include business valuation, performance evaluation, risk analysis, capital budgeting, inflation and tax issues, leasing, and business acquisitions. Prerequisite: B A 502.

FIN 560 Investments (4) Introduction to the nature, problems, and process of evaluating particular securities and portfolio construction and administration. Special attention is directed to the risk and rate of return aspects of particular securities, securities portfolios, and total wealth. Prerequisite: B A 502 or permission of graduate office.

FIN 561 Financial Futures and Options Markets (4) The pricing of options and futures contracts are analyzed and available empirical evidence is examined. Particular attention is given to the ways these instruments can be used to reduce an investor's or a firm's exposure to risk. Prerequisite: 560.

FIN 579 Special Topics in Finance (4, max. 12) Finance topics of current concern to faculty and students. Offered only when faculty are available and sufficient student interest exists. Seminar content announced in advance of scheduled offerings. Prerequisite: permission of instructor.

FIN 580 Doctoral Seminar in Financial Economics (4) Study of the financing of the corporation, including recent theoretical and institutional developments. Extensive reading and discussion in designated areas covering problems relating to financial management and to the social and economic implications of the financial process. Prerequisite: B A 500 or permission of instructor.

FIN 590 Doctoral Seminar in Capital Market Theory (4) Decision making under uncertainty, information and capital market efficiency, portfolio theory, capital asset pricing model, arbitrage pricing model, and options pricing model. Prerequisite: B A 500 or permission of instructor.

FIN 591 Doctoral Seminar in Corporate Finance (4) Principles of intertemporal choice, alternative valuation models, theory of investment under uncertainty, impact of dividend and financing decisions on firm valuation in perfect and imperfect markets, and theory of firm organization and agency costs. Prerequisites: 590 and BA RM 581 or ECON 582 or permission of instructor.

FIN 592 Doctoral Seminar in Financial Research (4) Empirical research in finance with emphasis on methodology and scientific method. Empirical research in market efficiency, capital asset pricing model, options pricing model, and impact of firm's dividend and financing decisions on firm value. Prerequisites: 590 and BA RM 581 or ECON 582 or permission of instructor.

FIN 599 Doctoral Seminar in Finance (1, max. 12) Study and research in advanced topics of finance. Generally concerned with unpublished areas of research, conducted by visiting professors and departmental faculty. Prerequisite: doctoral student status.

FIN 600 Independent Study or Research (*, max. 9)

Human Resources Management and Organizational Behavior

Courses for Undergraduates

HRMOB 301 Personnel Systems and Industrial Relations (3) The personnel/industrial relations function from a managerial perspective. Selection, compensation, performance appraisal, and training and development. Special emphasis on union-management relations and relevant behavior science research. Prerequisite: junior standing.

HRMOB 400 The Management of Organizational Behavior (4) Behavioral aspects of management in organizations, with emphasis on leadership, motivation, communication, conflict resolution, group dynamics, and organization development. Prerequisite: admission to business administration or permission of undergraduate office.

HRMOB 410 Staffing (4) Affirmative action, recruitment, testing, interviewing, placement, promotion, and overall human resource planning. Prerequisite: junior standing.

HRMOB 415 Performance Appraisal and Compensation (4) The various kinds of systems used by organizations to evaluate and reward employee performance. Job analysis, job evaluation, setting performance standards, giving appraisal feedback, designing incentive systems, administering a salary plan. Prerequisite: junior standing.

HRMOB 420 Collective Bargaining and Arbitration (4) Labor-management relations. The legal context, union organizing, grievance administration, collective bargaining. Individual and group simulations used. Prerequisite: junior standing.

HRMOB 450 Leadership and Decision Making (4) The manager as leader and decision maker. Various leadership theories, styles, and behaviors. Decision-making models and techniques. Prerequisite: junior standing.

HRMOB 460 Negotiations (4) The art and science of negotiations with the goal of making students more effective negotiators in a variety of business situations, such as budget negotiations, buying and selling, contracts, and merger negotiations. Concept and skill development. Prerequisite: junior standing.

HRMOB 470 Motivation and Performance (4) Various strategies for influencing employee motivation and performance. Reward systems, goal-setting procedures, and various techniques to enlarge and enrich ones job. Effects of these formal and informal strategies on job attitudes. Prerequisite: junior standing.

HRMOB 475 Organization Development and Change (4) Provides a conceptual understanding of organization development theory, practice, and research. Organization development is an umbrella term for a collection of behavioral science techniques for increasing individual, group, and organizational effectiveness. Prerequisite: junior standing.

HRMOB 490 Special Topics in Human Resources Management and Organizational Behavior (1-6) Topics of current interest to faculty and students. Offered when allowed by faculty availability and sufficient student interest. Content announced in advance of scheduled offerings. Prerequisite: junior standing.

HRMOB 499 Undergraduate Research (1-6, max. 9)

Courses for Graduates Only

Approval of the graduate business program office required. Entry code required for nonmajors.

HRMOB 501 Human Resource Management (3) Fair employment practice, job analysis, selection, performance appraisal, and training. May include compensation and labor relations.

HRMOB 510 Staffing (4) Systems related to manpower planning, recruitment, interviewing, placement, and development. Advanced techniques, with emphasis on validating predictive measures of performance. Criteria development, psychological testing, validation procedures, and cost effectiveness of personnel research.

HRMOB 515 Performance Appraisal and Compensation (4) Strategies, procedures, and problems in evaluating and rewarding employees. Performance measurement methods, different appraisal systems, and ways of coaching employees. Ways to integrate performance appraisal into compensation systems.

HRMOB 520 Collective Bargaining (4) Traditional labor-management relations in private, public, and nonprofit sectors with special emphasis on grievance arbitration and collective bargaining processes. Simulations and case studies.

HRMOB 525 Dispute Settlement and Labor-Management Cooperation (4) Goes beyond traditional collective bargaining and grievance arbitration to examine the role of third parties as mediators, interest arbitrators, and fact finders. New forms of labor-management cooperation, such as gain sharing, quality of work life programs and labor-management committees.

HRMOB 540 Managerial Behavior in Cross-Cultural Settings (4) The role of culture as it impacts managerial values and behavior in diverse national settings including the United States, western Europe, Latin America, and Japan.

HRMOB 550 Leadership (4) Various theories of leadership: trait theories, leader behavior theories, and situational theories. Concept of leadership within the broader framework of power-how power is gained, lost, and distributed within organizations.

HRMOB 560 Negotiations (4) Strategy used in negotiations other than labor-management bargaining to develop skills necessary to devise a negotiating strategy appropriate to situation. Negotiation of contracts in simulated business settings, case studies, readings.

HRMOB 570 Motivation (4) Approaches that emphasize people's needs, effects of reward systems, and goal setting, as well as topics that show how the social environment and the task itself influence motivation. Different motivational techniques to be used under various conditions.

HRMOB 575 Theory and Practice in Organizational Development (4) Theory, practice, and research in organizational development; the applied discipline that seeks to improve organizational effectiveness, efficiency, and morale through causing changes in managerial practices and organizational dynamics. History of the field, intervention techniques, diagnostic methods, and client-consultant relations. Concepts and skill development.

HRMOB 579 Special Topics in Human Resources Management and Organizational Behavior (4, max. 12) In-depth study and research on topics of special interest to faculty members and students in the fields of human resources management and organizational behavior. Offered on an ad hoc basis. Content announced before scheduled offering.

HRMOB 580 The Individual and the Organization (3) Focuses on attributes the individual brings to the organization. Covers important performance-related processes such as learning, motivation, and decision-making as well as an understanding of personal attitudes and personality traits.

HRMOB 581 Groups, Teams, and Organizations (3) Focuses on importance of group processes for organizational effectiveness. Covers concepts of group dynamics including interpersonal communication, role and norm development, and group decision making as well as organizational processes such as team development and organizational culture.

HRMOB 582 Power, Influence, and Citizenship Behavior (3) Focuses on ways in which the individual and the organization get things done through working with others. Includes leadership, social influence, and the use and abuse of power, with attention given to positive organizational activities such as citizenship behavior and extra role activities.

HRMOB 590 Organization Entry, Training, and Exit (3) Focuses on the systems, processes, and experiences that newcomers to organizations undergo. Covers staffing, employee selection, training, socialization, and attachment.

HRMOB 591 Employee Appraisals and Rewards (3) Focuses on the organization's employee performance appraisal and compensation systems. Examines effects of different practices.

HRMOB 592 Employee Rights, Protection, and Justice (3) Focuses on the systems and procedures that safeguard an individual's employment and benefits. Topics include industrial relations and corporate performance, labor-management cooperation, grievance systems, dispute resolution, whistle blowing, and organizational justice.

HRMOB 599 Doctoral Seminar in Human Resources Management and Organizational Behavior (1, max. 12) Advanced topics in the fields of human resources management and organizational behavior. May be used by visiting faculty members to present topics of interest to students. Prerequisite: doctoral student status.

HRMOB 600 Independent Study or Research (*, max. 9)

Information Systems

Courses for Undergraduates

I S 300 Introduction to Information Systems (4) Fundamentals of information systems, what they are, how they affect organizations. Technical and organizational foundations of information systems, building information systems, managing information system resources. Laboratory emphasizes using computer to analyze, coordinate, solve organizational decision-making problems. Prerequisites: ACCTG 210, 220, 230, ECON 200, MATH 111, 112, QMETH 201 or equivalent.

I S 320 Fundamentals of Application Programming (4) Fundamental programming concepts including data types, control structures, modularization, and structure programming. Developing solutions for problems in interactive business applications. Introduction to data and file structures. Extensive use of an event-driven programming language. Prerequisites: 300 and junior standing.

I S 422 Applications Programming for Information Systems (4) Advanced computer programming using COBOL and program development tools. Structured design based on system documentation and specifications. Use of COBOL for transaction processing and complex file management activities. Prerequisite: 320.

I S 423 Object-Oriented Systems (4) Covers the design and programming of object-oriented application software. Includes introduction to object-oriented principles, representing objects in software, object management, object analysis and design, construction of object-oriented applications, and use of object-oriented language to program working applications. Prerequisite: 320.

I S 480 Systems Analysis and Design I (4) First course in analysis and design of business information systems. Concentrates on analysis phase of systems development. Systems development life cycle, the feasibility study, analysis of user requirements, and the development of a logical model for the system under study. Prerequisites: 320 and junior standing.

I S 461 Systems Analysis and Design II (4) Second course in analysis and design of business information systems. Concentrates on design and implementation phases of systems development. Translation of logical system model into physical model, design of modules, file design, testing, implementation. Includes a project using third- and fourth-generation software development tools. Prerequisites: 460 and either 422 or 423 or permission of instructor.

I S 470 Business Data Communications (4) Technology and applications of business data communications including characteristics of data, fundamentals of transmission, communications hardware and software, common-carrier services, network configurations (LAN, MAN, WAN), design, management, and security. Exercises in use of information retrieval/distribution systems, file transfer, and Internet resources. Prerequisites: 320 and junior standing.

I S 480 Data Base Management (4) Concepts of physical and logical data base organization. Physical file structures used in data management. Logical data models, including hierarchical, network, relational.

Data base design, data dictionaries, data manipulation languages. Exercises in design, implementation, and use of data base systems. Survey of commercial data base management systems. Prerequisites: 320 and junior standing.

I S 490 Selected Topics in Information Systems (1-6, max. 20) Topics of current concern to faculty and students. Potential topics include networks and distributed information-processing systems, office automation, artificial intelligence and knowledge-based systems, new approaches to systems development, fourth- and fifth-generation languages, economics of information systems. Prerequisites: 320 and junior standing.

I S 495 Practical Experience in Information Systems (1-4, max. 4) Information Systems internship. Weekly status reports, internship value paper, and project related to internship. Prerequisites: 300, 320, one 400-level Information Systems course, and permission of instructor.

I S 499 Undergraduate Research (1-6, max. 12) Selected problems in information systems and computer applications. Prerequisite: permission of instructor.

Courses for Graduates Only

Approval of the graduate business program office required. Entry code required for nonmajors. Students interested in probability and statistics are also urged to consider BA RM 500 and 501.

I S 530 Management of Information Systems Resources (4) Topics include general control problem in organizations; performance evaluation of data processing managers; technology and cost trends; software cost estimation; capacity planning; short term utilization; queueing and associated externalities; issues in centralization and decentralization of the information system facilities. Prerequisite: B A 501 or equivalent.

I S 545 Database Management (4) Concepts of physical, logical database organization. Physical file structures used in data management. Logical data models, including hierarchical, network, relational. Database design. Data dictionaries. Data manipulation languages. Exercise in design, implementation, use of several database management systems. Survey of commercial database management systems. Database administrator's role. Prerequisites: B A 501 and introductory knowledge of a programming language.

I S 560 Information Systems Development (4) Offers comprehensive look at information systems development from the initial stage of defining requirements to final evaluation of installed systems. Topics include analysis of use requirements, development of logical system model, translation of logical systems model into physical system model, testing, and implementation. Prerequisites: B A 501 or equivalent.

I S 579 Selected Topics in Information Systems (4, max. 12) Topics of current concern to faculty and students. Potential topics include networks and distributed information-processing systems, office automation, artificial intelligence and knowledge-based systems, new approaches to systems development, fourth- and fifth-generation languages, economics of information systems. Prerequisite: B A 501.

I S 585 Advanced Database Research (4) Introduces topics of interest in database research including heterogeneous database, derived data management, expert database systems, logical and physical database design, formal languages for data manipulation, and temporal databases. Prerequisites: doctoral student and previous course work and experience with database management system or permission of instructor.

I S 586 Data Structures and Algorithms in Information Systems (4) Design of computer algorithms in

information systems. Methods for analyzing in terms of time and space. Data structures and design techniques used in the solution of frequently encountered problems. Prerequisites: doctoral student and working knowledge of a programming language or permission of instructor.

IS 588 Advanced Expert Systems (4) Study of methodological, behavioral, and economic considerations of uncertainty handling in expert systems. Topics include the Certainty Factor model, the Depster-Shafer theory, and probabilistic belief networks. Prerequisites: doctoral student and introductory knowledge of a programming language and basic probability theory or permission of instructor.

IS 599 Doctoral Seminar (1, max. 12) Advanced topics of information systems. Generally concerned with unpublished areas of research and conducted by visiting professors and departmental faculty. Prerequisite: doctoral student status.

IS 600 Independent Study or Research (*, max. 9)

International Business

Courses for Undergraduates

IBUS 300 The International Environment of Business (5) Prepares students to understand the most important aspects of the international political economy. Emphasis on the important relationships among nations and business and economic institutions that influence students' performances as managers, consumers, and citizens. Prerequisites: ECON 200, 201, admission to business administration or permission of undergraduate office.

IBUS 330 Business Environment In Developing Nations (4) The international environment for transnational trade, investment, and operations in the less-developed countries; survey of the economics of underdevelopment; analysis of foreign economic, cultural, and political environments and their impact on international business; foreign investment in the development process; case studies. Prerequisites: 300 or equivalent and junior standing.

IBUS 340 Business Environment In Industrial Countries (4) Factors and conditions affecting business operations and behavior in developed countries, international integration, business relations among nation states and integrated supranational systems, direct investment and multinational industrial activities, analysis of sources and causes of international change. Prerequisites: 300 or equivalent and junior standing.

IBUS 440 Business In Japan (4) Major aspects of the Japanese business environment and how Japanese enterprises are managed. Problems and opportunities of foreign corporations in Japan. Prerequisite: 300 or 550 or permission of instructor.

IBUS 470 Management of International Trade Operations (4) Applicable for students interested in exporting and importing activities, but especially relevant to small companies. Management of import-export operations and the application of relevant functional tools. Cases and class projects are drawn from service companies as well as from manufacturers. Prerequisites: 300 and junior standing.

IBUS 480 Multinational Operations Management (4) Case studies in foreign operations management: planning international objectives and strategies; developing multinational company structures and executives; adapting administrative practices and operating policies to international diversities. Prerequisites: 300, 470, and junior standing.

IBUS 490 Special Topics In International Business (1-8, max. 12) Students and faculty focus on current topics of concern. Offered when faculty, student interest, and availability allow. Prerequisites: 300 or permission of instructor and junior standing.

dent interest, and availability allow. Prerequisites: 300 or permission of instructor and junior standing.

IBUS 499 Undergraduate Research (1-6, max. 9) Prerequisite: 300 or equivalent and permission of instructor.

Courses for Graduates Only

Approval of the graduate business program office required. Entry code required for nonmajors.

IBUS 530 International Business In Less Developed Countries (4) Understanding the economic, sociocultural, and political environment in the less developed countries. Problems of international trade and investment, north-south relations, commodities, technology transfer, foreign aid, and capital flows. Prerequisites: B A 500 or course in international economics or trade or international finance, or permission of graduate office.

IBUS 540 International Business In Industrialized Countries (4) Understanding the economic, sociocultural, and political environment in developed, industrialized countries. Problems of international trade and payments relations, economic integration, national policies, and supranational organizations' impact on managerial environments. Prerequisite: B A 500 or course in international economics or trade or international finance, or permission of graduate office.

IBUS 550 Field Studies In International Business (4) Research, analysis, and report on a specific international business project with an existing organization involved with international trade. Possible tasks include identifying most viable foreign target markets, developing best market entry strategies, establishing international terms and conditions of sale, and completing a preliminary marketing or business plan for clients.

IBUS 560 Multinational Business Management (4) Managerial responses to problems of international business organizations and operations. Strategy formulation in an international context; design and control of multinational organization; adaptation of management systems and policies to different economic, sociocultural, and political environments. Prerequisite: B A 500 or course in international economics or trade or international finance, or permission of graduate office.

IBUS 575 Business Studies Abroad (*, max. 24) Research and study of foreign business problems in the country or countries where the firms are located. Limited to students who have the approval of their major adviser and a faculty member who has agreed to direct their work in accordance with a definite program of studies. Credit/no credit only.

IBUS 579 Seminar: Special Topics In International Business (4, max. 12) Application of international business principles to the analysis of a specific issue in trade or resource transfer, or to the business conditions in a particular country. Japan and other Pacific Rim countries are frequent topics. Prerequisite: B A 500 or permission of instructor.

IBUS 600 Independent Study or Research (*, max. 9)

Marketing

Courses for Undergraduates

MKTG 301 Marketing Concepts (4) Tools, factors, and concepts used by management in planning, establishing policies, and solving marketing problems. Marketing concepts, consumer demand and behavior, location analysis, marketing, functions, institutions, channels, prices, and public policy. Prerequisites: ECON 200 and admission to business administration or permission of undergraduate office.

MKTG 310 Product and Price Policies (4) Important aspects of product planning and development, product line decisions, packaging, brand policies, guarantees, and services. Price theory is considered but emphasis is placed on special pricing policies and problems and legal constraints on pricing activity. Prerequisites: 301, B ECON 300, and junior standing.

MKTG 335 Principles of Selling (4) Focuses on role of influence and persuasion in professional selling and other organizational settings. In addition to formal theoretical coursework in such areas as consumer behavior, negotiation, and communication, students practice sales skills in role plays, presentations, and other exercises requiring practical application of selling theory.

MKTG 340 Advertising (4) Management of the advertising function and its integration with other forms of promotion. Planning the program, determining the most effective approach, evaluation of media and budget, advertising research, advertising institutions, economic and social aspects. Prerequisites: 301 and junior standing.

MKTG 370 Retailing (4) Profit planning and business control; buying, stock control, pricing, promotion; store location, layout, organization, policies, systems; coordination of store activities. Prerequisites: 301 and junior standing.

MKTG 430 Sales Force Management (4) Sales and distribution planning; sales organization and training; management of the sales force; methods of sales, cost, and performance analysis. Prerequisites: 301 and junior standing. Offered: AWSp.

MKTG 450 Consumer Behavior (4) Theory and practice pertinent to marketing decisions of individuals and business firms; utilization of theories from behavioral sciences in marketing research; theories of fashion, characteristics of goods, shopping behavior, product differentiation, market segmentation, and opinion leadership; application of concepts to management of advertising, personal selling, pricing, and channels of distribution. Prerequisites: 301 and junior standing. Recommended: QMETH 201.

MKTG 460 Marketing Research (4) Marketing research process; preliminary steps and research design, questionnaires, secondary and primary data, sampling, processing and interpreting data, evaluation and effective presentation of findings. A class research project provides practical application of methods studied. Prerequisites: 301, QMETH 201, or equivalent, and junior standing.

MKTG 465 Marketing Research Topics (4) Topics such as experimental design, market analysis, positioning and segmentation research, advertising research, forecasting, and new product research covered in varying depths, depending on instructor's emphasis. Prerequisite: 460.

MKTG 475 Retail Structure and Strategy (4) Analysis of the nature and scope of competition within and between sectors of retail trade. Emphasis is placed on the importance of demographic, environmental, and legal differences between geographical areas in determining the level of competition. Prerequisites: 301 and senior status. Recommended: 370.

MKTG 480 Advanced Marketing Management (4) Introduction to advanced marketing management through the application of various decision-making models and selected computer routines to such marketing problems as advertising budgeting, media planning, sales forecasting, sales-force allocation, and pricing. Applications include market simulation, Bayesian approaches, and linear programming. Prerequisites: 301, MATH 157, or equivalent, and junior standing.

MKTG 485 Cases In Marketing Management (4) Analysis of managerial marketing cases involving

market trends, marketing research, product planning, distribution channels, pricing, promotion, and social trends. Prerequisites: 301 and senior standing.

MKTG 490 Special Topics and Issues in Marketing (1-8, max. 8) Contemporary topics and issues in marketing: marketing in nonprofit organizations, marketing of services, marketing in the public sector, and marketing in an economy of scarcity. Ordinarily only one topic area is addressed in any one quarter. Course content reflects contemporary developments and the current interests of instructors and students. Prerequisites: 301 and junior standing.

MKTG 499 Undergraduate Research (1-6, max. 9) Prerequisite: 301 or equivalent and permission of instructor.

Courses for Graduates Only

Approval of the graduate business program office required. Entry code required for nonmajors.

MKTG 510 Product and Price Management (4) Identification of market opportunities, choice of which goods and services in what combinations to market, and prices at which to offer them. Considers product and price interrelationships in product-line management; product differentiation; the marketing mix; and multiple-market, oligopoly, and monopoly contexts. Includes policy considerations. Prerequisite: B A 501.

MKTG 520 Distribution Management (4) Location and distribution decisions for goods and services in profit and nonprofit organizations. Considers methods of optimizing the number and quality of institutions and activities employed in dealing with exchange, and space and time aspects of distribution. Relates distribution questions to the marketing mix and organizational objectives. Prerequisite: B A 501.

MKTG 525 Strategic Retail Management (4) Emphasis on strategic planning decisions faced by senior management in a wide range of retail industries. Taught exclusively by the case method. Prerequisite: B A 501.

MKTG 530 Management of Sales Operations (4) Management of personal selling activities within a marketing program. Setting objectives, determining sales strategies; recruiting, selection, and training of sales representatives; allocation of effort, supervision, compensation, and control. Emphasis on case studies. Prerequisite: B A 501.

MKTG 540 Advertising and Promotion Management (4) Management of advertising and promotional activities and their integration with other elements of the marketing mix. Topics include: understanding the communication process, analyzing markets, working with suppliers, establishing objectives, determining budgets, selecting media, measuring and evaluating effectiveness, using publicity and promotions. Legal, social, and economic consequences are considered. Prerequisite: B A 501.

MKTG 550 Consumer Behavior (4) Analysis of current research in consumer behavior. Topics include consumer decision making processes, models of buyer behavior, and contributions from the behavioral sciences. Prerequisite: B A 501.

MKTG 555 Entrepreneurial Marketing and Management (4) Focuses on role of managers in fostering profitable growth and entrepreneurial actions within ongoing organizations. Class sessions utilize current analytical and conceptual methods, case and field studies, management development exercises, and *Foodcorp, Inc.* which allows students to simulate management of multinational corporations. Prerequisite: B A 501. Offered: jointly with B POL 555.

MKTG 560 Research for Marketing Decisions (4) Methods and applications of marketing research incorporating analytical procedures and relevant con-

cepts from behavioral and quantitative sciences. Deals with various aspects of research: problem definition, research design, questionnaire construction, sampling, and data analysis. Introduces promising new developments: multivariate techniques of data analysis, laboratory and field experimentation, and demand analysis in both business and public environments. Prerequisite: B A 501.

MKTG 565 Analysis of Multivariate Marketing Data (4) Methods for analyzing multivariate data in such marketing research problems as market segmentation and product positioning. The analytical procedures include factor, cluster, and discriminant analysis; multidimensional scaling, and conjoint measurement. Prerequisites: B A 501, QMETH 500.

MKTG 570 International Marketing (4) Analysis of the marketing strategies and tactics of multinational corporations. Choice of entry strategies for foreign markets, analyzing international competition at home and abroad, and developing global marketing strategies. Prerequisite: B A 501. Recommended: one I BUS course.

MKTG 575 Strategic Market Management (4) The marketing dimensions of strategic planning with emphasis on identifying market opportunities and implementing appropriate competitive advantage strategies. Includes strategies to stimulate brand demand; defend ones market position; manage the behavior of competitors; manage the behavior of suppliers; and increase the market orientation of ones business. Prerequisite: B A 501.

MKTG 579 Special Topics in Marketing (4, max. 12) Marketing topics of current concern to faculty and students. Offered only when allowed by faculty availability and sufficient student interest. Seminar content to be announced in advance of scheduled offerings. Prerequisite: B A 501.

MKTG 581 Doctoral Seminar in Consumer Behavior (4) *Ruth, Yalch* Survey of the field of consumer behavior introduces fundamental topics in consumer behavior including cognitive processes, emotion, and consumer satisfaction. Provides exposure to a variety of research methods including experiments, surveys, and phenomenological research.

MKTG 582 Doctoral Seminar in Multivariate Analysis for Marketing Research (4) *MacLachlan, Molnour* Survey of methods useful for empirical evaluation of multivariate marketing phenomena and relationships. Includes an overview of measurement theory and practice; multidimensional scaling; conjoint analysis; cluster, factor, and discriminant analyses; multivariate analysis of variance; structural equation modeling; and other methods commonly encountered in academic marketing research.

MKTG 583 Doctoral Seminar in Marketing Strategy (4) *Jacobson, Narver* Study of factors influencing business performance and role of marketing in achieving competitive advantage. Analysis of prevailing, and emerging, theories underlying strategic thinking and competitive process. Examination of empirical research regarding measurement, level, and persistence of business success and implications of findings for theory and strategy development. Prerequisite: BA RM 580.

MKTG 584 Doctoral Seminar in Marketing Systems (4) *Gautschi, Ingene* Examines fundamental and institutional dynamics within marketing systems. Addresses market intermediation, including conditions under which institutions survive, flourish, or retreat and relevant forces on marketing systems including public policy, transportation, infrastructure, information and communications systems, business cycles, levels of economic development, international trade.

MKTG 591 Doctoral Seminar in Social Influences and Marketing (4) *Louie, Ruth* Investigates topics in social cognition as related to the field of marketing.

Examination of ways the principles in social cognition influence consumers' individual responses to marketing-related activities and ways in which the field of marketing, in turn, influences one's understanding of the macro-social environment.

MKTG 592 Doctoral Seminar in Information Processing Theories of Consumer Behavior (4) *Ruth, Yalch* Considers the processes used by consumers to acquire and evaluate market information including advertising, publicity, word of mouth, packaging, product description, price, and retail outlets.

MKTG 593 Doctoral Seminar in Marketing Models (4) *Erickson, Ingene* Focuses on modeling research efforts in various areas of marketing. Discussion of mathematical and statistical modeling approaches which contribute to scientific development in the marketing area and ways in which modeling is used to characterize and summarize the nature of general marketing situations in complex environments. Prerequisite: ECON 500.

MKTG 594 Doctoral Seminar in Pricing and Distribution Channels Models (4) *Erickson, Ingene* Provides current coverage of the marketing science literature on pricing and channels of distribution. Discussions focus on the conceptual and theoretical evaluation of mathematical modeling research as it applies to these two intertwined areas of marketing as well as on ways in which to contribute to that literature. Prerequisite: 593.

MKTG 599 Doctoral Seminar in Marketing (1, max. 12) Study and research in advanced topics of marketing. The seminar is generally concerned with unpublished areas of research and conducted by visiting professors and departmental faculty. Prerequisite: doctoral student status.

MKTG 600 Independent Study or Research (*, max. 9)

Operations Management

Courses for Undergraduates

OPMGT 301 Principles of Operations Management (4) Examines problems encountered in planning, operating, and controlling production of goods and services. Topics include: waiting-line management, quality assurance, production systems, project management, and inventory management. Computer and quantitative models used in formulating managerial problems. Prerequisites: ACCTG 210, 220, 230, ECON 200, MATH 111 and 112, and QMETH 201 or equivalent.

OPMGT 402 Introduction to Logistics (4) Logistics studies of the efficient delivery of goods and services. A total-cost approach recognizes this involves not only the obvious vehicle-routing issues but also shipment size and mix, warehouse location, product design, and customer services. Includes study of real companies' logistics problems. Prerequisites: 301, QMETH 201.

OPMGT 443 Inventory and Materials Management (4) Production and inventory management decisions for manufacturing and distribution firms. Techniques for forecasting demand for finished product items; role of inventories and aggregate planning in production process. Integrated materials requirements planning (MRP) and capacity planning. Prerequisite: 301 or equivalent.

OPMGT 450 Introduction to Project Management (4) Focuses on the management of complex projects and the tools and techniques which have been developed in the past 25 years to assist managers with such projects. The course covers all elements of project planning, scheduling and control as well as implementation and organizational issues. Prerequisite: 301.

OPMG 490 Special Topics in Operations Management (1-6, max. 20) Operations management topics of current concern to faculty and students. Potential topics are: logistics management, project scheduling, manufacturing strategy, site and location analysis, management of service operations. Prerequisite: 301.

OPMG 499 Undergraduate Research (1-6, max. 9) Prerequisite: permission of instructor.

Courses for Graduates Only

Approval of the graduate business program office required. Entry code required for nonmajors.

OPMG 535 Logistics and Physical Distribution Management (4) Deals with management of the distribution process including all activities involved in physically moving raw materials and finished goods from point of origin to point of consumption. Topics include warehousing, locations, purchasing, and strategic planning in physical distribution organizations. Prerequisites: 502 or B A 502 or equivalent and permission of graduate office.

OPMG 545 Strategic Management of Quality (4) Study of strategic role of quality of products and services. Managerial concepts for implementing quality strategy and improving quality including Total Quality Management (TQM), Statistical Process Control (SPC), economics of quality, and approaches suggested by Deming, Juran, and others. Prerequisites: 502 or B A 502 or equivalent.

OPMG 550 Project Management (4) Management of complex projects, and tools and techniques (e.g., CPM and PERT) developed to aid the planning, scheduling, and control of projects. Includes work breakdown structures, precedence networks, Gantt charts, resource leveling and allocation, and the use of microcomputer programs. Prerequisite: B A 502.

OPMG 570 Operations Strategy (4) Develops a general framework for creating and analyzing a strategy for domestic and international manufacturing-based companies and industries. Identifying and integrating those categories of manufacturing decisions that have a strategic impact. Work-force management, capacity planning, and organization of the manufacturing function. Course based substantially on case studies. Prerequisite: B A 502.

OPMG 575 Manufacturing Planning and Control (4) Focuses on planning decision for manufacturing firms with emphasis on Material Requirements Plan (MRP) system. Topics include inventory management, capacity planning, operations scheduling, assembly line balancing, cellular manufacturing, and Just-in-Time (JIT) techniques. Prerequisites: 502 or B A 502.

OPMG 577 System Dynamics (4) Presents applied systems thinking, strategic modeling, and learning organizations. Analysis of feedback system structure including cause and effect relations within feedback loops and dynamics of behavior and managerial, social and economic systems. Construction of continuous-flow computer simulation models using specialized languages such as ITHINK, STELLA, and DYNAMO. Prerequisite: 502 or B A 502.

OPMG 579 Special Topics in Operations Management (4, max. 12) Major topics in operations management and systems analysis. Emphasis on research and, where appropriate, application of quantitative analysis and computers. Topics vary, including workforce planning, project management, research and development management, quality assurance, technology planning and forecasting, systems analysis of complex organizations, and urban systems analysis. Prerequisite: B A 502.

OPMG 580 Facility Layout and Location (4) Focuses on quantitative models used to analyze problems in the layout and location of economic facilities in both the public and the private sectors with emphasis

on current research. Prerequisites: QMETH 580 or equivalent and doctoral student or permission of instructor.

OPMG 587 Advanced Topics in Inventory Management (4) Survey of literature in inventory/production control with emphasis on current research. Topics include single-echelon deterministic and probabilistic models and multi-echelon stochastic models. Prerequisite: QMETH 592 and course in probability theory and in stochastic processes.

OPMG 590 Theory of Scheduling (4) Considers scheduling problems in different production environments including assembly lines and flow shops as well as closed and open job shops. Discussion of optimization and heuristic techniques for sequencing, due-date assignment, release time determination, labor assignment, and lot sizing. Prerequisite: doctoral student or permission of instructor.

OPMG 599 Doctoral Seminar in Operations Management (1, max. 12) Study and research in advanced topics of operations management. The seminar is generally concerned with unpublished areas of research and is conducted by visiting professors and departmental faculty. Credit/no credit only.

OPMG 600 Independent Study or Research (*, max. 10)

Organization and Environment

Courses for Undergraduates

O E 200 Introduction to Law (5) Legal institutions and processes; law as a system of social thought and behavior and a frame of order within which rival claims are resolved and compromised; legal reasoning; law as a process of protecting and facilitating voluntary arrangements in a business society. Prerequisite: sophomore standing.

O E 302 Organization and Environment (4) Political, social, and legal environment of business. Critical managerial issues from historical, theoretical, ethical perspectives; their impact on organization. Corporate political power, boards of directors, capitalism, industrial policy, business ethics and social responsibility, alternative corporate roles in society. Prerequisite: admission to business administration or permission of undergraduate office.

O E 310 Political and Regulatory Environment of Business (5) Managerial implications of restrictions imposed by government on corporations from legal point of view. Constitutional law impacting business managers; antitrust, administrative, and regulatory issues; environmental law, product liability law, and securities law. Not a business or commercial law course. Prerequisite: junior standing.

O E 314 Historical Development of the Business-Government Relationship (3) Business-government relationships in American history, with aim of defining and explaining patterns in attitudes and behavior rather than detailing events. Discussions organized in terms of policy areas (e.g., national banking, transportation, agriculture, energy, industry in wartime, trade, and research). Prerequisite: junior standing.

O E 316 Business Ethics and Corporate Social Responsibility (3) Philosophical and pragmatic perspectives, including values and social/ethical premises in organizational decision making. Several issues covered in depth: investments abroad, hazardous products, bribery, industry practices, and others. Prerequisite: junior standing.

O E 403 Commercial Law (5) Principles of the law of contracts, agency, property, sales, negotiable instruments, and security transactions. Prerequisites: 200, junior standing.

O E 440 Organization Structure (3) Concepts of formal organization structures, power, authority, and influence; delegation and decentralization, strategic planning, decision making; philosophy and values in management, the organization in the context of the environment and its impact on the organization's subsystems. Prerequisites: HRMOB 400 and admission to business administration or permission of undergraduate office.

O E 441 Advanced Organization Theory (3) Current research, measuring of organizational effectiveness, planning for alternate structural relationships, developments in related disciplines, and current issues. Prerequisite: 440.

O E 490 Special Topics and Issues in Organization and Environment (1-6) Topics and issues of business organization and a changing environment. Content reflects interests of faculty members and students not otherwise covered in the curriculum. Prerequisite: junior standing.

O E 499 Undergraduate Research (1-6, max. 9) Selected problem areas or issues in consultation among faculty members and students. Prerequisite: permission of the undergraduate office.

Courses for Graduates Only

Approval of the graduate business program office required. Entry code required for nonmajors.

O E 510 Organization and Environment (4) Business organization's political, social and legal environments. Critical managerial issues from historical, theoretical, and social/ethical perspectives. Corporate political power, corporate boards of directors, industrial power, social responsibility, business ethics, roles of the corporation in society, themes of change.

O E 511 Legal and Regulatory Constraints on Business (4) Managerial implications of restrictions imposed by government on corporations from legal point of view. Employment law, environmental law, product liability law, securities law, campaign finance law. Not a business or commercial law course.

O E 513 Business Ethics and Corporate Responsibility (4) Business ethics and corporate social responsibility from philosophical, theoretical, and pragmatic perspectives. Ethical theories and the role of values in business. Ethics and social responsibility put into a framework useful for practicing managers.

O E 514 Commercial Law (4) Principles of the law of property sales, negotiable instruments, and security transactions.

O E 550 Organization and Management (4) Integrates management as practice, theory, and research. Concepts and values, alternative theories, organizational rationality, cooperative and coordinated systems, bureaucracy and classical organization theory, executive function, accountability and legitimacy; manager's role in matching environment, culture goals, strategy, structure, technology, and control systems.

O E 560 Seminar in Organization Design (4) Top managers can choose among alternative organizational forms. Each is dependent on the current stage in the organization's life cycle, the organization's strategy, and internal organization practices. Conditions that lead to effective organization design.

O E 570 Seminar in Management of Technology and Innovation (4) Critical issues relating to the management of technology and innovation. How to design innovative organizations in terms of strategy, structure, and process. The innovation process, creativity, management of professionals, technical and strategic leadership, entrepreneurship, intraentrepreneurship, and matrix management.

O E 575 Seminar in Advanced Organization Theory (4) Major issues and problems in the design and conduct of organization theory research. Organ-

zational philosophy, structural congruence with environment, goals and effectiveness, culture and values, power and politics, information and control, and structure and bureaucracy.

O E 579 Special Topics in Organization and Environment (4, max. 12) Topics of current concern to faculty members and students. Offered only when faculty members are available and there is sufficient student interest.

O E 600 Independent Study or Research (*)

Quantitative Methods

Courses for Undergraduates

Statistics

QMETH 201 Introduction to Statistical Methods (4) NW/QSR Survey of principles of data analysis and their applications for management problems. Elementary techniques of classification, summarization, and visual display of data. Applications of probability models for inference and decision making are illustrated through examples. Prerequisites: MATH 112 or equivalent, and sophomore standing.

QMETH 300 Quantitative Analysis for Business (4) Introduction to mathematical tools utilized for analysis of business problems; appreciation of the use of these tools in business situations; calculus; linear algebra. Prerequisites: MATH 112 and junior standing.

QMETH 302 Statistical Methods for Quality Management (4) Philosophies and statistical methods for quality management with applications to both manufacturing and service sectors. Topics include definition and measures of quality, seven QC tools, process capability, design of control charts, design of experiments, and multiple regression. Prerequisite: 201 and junior standing.

Business Mathematics and Operations Research

QMETH 450 Spreadsheet Models for Managerial Decision Making (4) Formulation and solution of business problems using operations research techniques in a spreadsheet environment. Techniques of linear and integer programming, dynamic programming, network optimization, queueing, and simulation. Applications from marketing, finance, and operations. Prerequisites: 300 or equivalent and junior standing.

QMETH 490 Special Problems in Quantitative Analysis (1-6, max. 20) Specialized quantitative techniques useful for solving business problems. Topics from operation research, statistics, computer methods. Emphasis on application. Prerequisites: 401, 450, depending on topic, and junior standing.

QMETH 499 Undergraduate Research (1-6, max. 9) Research in selected problems in business statistics, operations research, decision theory, and computer applications. Prerequisite: permission of instructor.

Courses for Graduates Only

QMETH 503 Practical Methods for Data Analysis (4) Presentation of basic exploratory data analysis with business examples. Data summaries, multivariate data, time series, multiway tables. Techniques include graphical display, transformation, outlier identification, cluster analysis, smoothing, regression, robustness. Prerequisites: B A 500 or equivalent or permission of instructor. Offered: jointly with STAT 503.

QMETH 520 Managerial Applications of Regression Models (4) Data exploration and inference using regression models for business forecasting and management. Models include simple, multiple, logistic, and nonlinear regression, use of dummy variables, transformations, variable selection, and diagnostics. Prerequisite: 500 or B A 500.

QMETH 528 Survey Sampling Applications (4) Introduction to design and implementation of sample surveys with emphasis on business applications. Simple random, stratified, cluster, multistage sample methods. Probability sampling, optimal allocation of sampling units. Mail, telephone, interview methods. Estimation methods, Questionnaire design. Non-response. Prerequisites: 500 or B A 500 or equivalent or permission of instructor.

QMETH 530 Forecasting Models in Business (4) Introduction to time series analysis and forecasting. Topics include seasonal adjustment, decomposition, exponential smoothing, moving average, and autoregression as well as model identification, estimation, diagnostics, and adaptive forecasting illustrations using real data. Prerequisite: 500 or B A 500.

QMETH 551 Linear and Integer Programming (4) Advanced modeling in linear and integer programming. Linear programming includes formulations, simplex method and variations, duality theory, sensitivity and parametric analysis, quadratic and separable programming; integer programming includes formulations and algorithms (branch and bound and cutting planes). Application areas include production, scheduling, distribution, marketing, finance. Prerequisite: B A 501 or equivalent.

QMETH 579 Special Topics in Quantitative Methods (4, max. 12) Presentation of topics of current concern to students and faculty in operations research and applied business statistics. Potential topics include applications and extensions of mathematical programming, stochastic processes, discrete programming, networks models, and the application of statistical techniques.

QMETH 580 Mathematical Programming (4) Advanced survey of mathematical programming with applications to business problems. Includes linear, integer, stochastic, nonlinear, and dynamic programming and network optimization. Treatment includes formulation, optimality conditions, duality theory, solution algorithms. Applications to production, scheduling, marketing, finance, and equipment replacement. Prerequisites: B A 501 or equivalent and doctoral student or permission of instructor.

QMETH 592 Stochastic Models: Queueing and Simulation (4) Application of stochastic processes to business problems. Focuses on development and application of queueing theory and discrete event simulation. Prerequisites: stochastic processes, knowledge of high level programming language, and doctoral student or permission of instructor.

QMETH 599 Doctoral Seminar in Operations Research (1, max. 12) Study and research in advanced topics of operations research. The seminar is generally concerned with unpublished areas of research and is conducted by visiting professors and departmental faculty. Prerequisite: doctoral student status.

QMETH 600 Independent Study or Research (*)

Strategic Management

Courses for Graduates Only

ST MGT 591 Theories of the Firm and Strategic Management: Economic Models (4) Reviews the economic theories that support strategies pursued by firms and explores the links between market processes, firm strategy, and firm performance. Topics include agency theory, transaction cost economics, resource dependence, population ecology, and neo-Austrian economics.

ST MGT 592 Theories of the Firm and Strategic Management: Sociological Models (4) Explores the sociology of organizations from multiple perspectives while introducing fundamental sociological questions and preparing students for conducting research in organizations. Emphasis on structural contingencies, institutions, resource dependence, population ecology, negotiated order and culture, organizational learning and decision making, organizational power and politics, networks, and inter-organizational relations.

ST MGT 593 Contemporary Strategic Management Research (4) Facilitates understanding of empirical foundations of theory development and testing in contemporary strategic management research. Focuses on evaluation of ways in which the empirical tradition has evolved in the strategic management area. Attention to evaluating research methodologies used in the field.

ST MGT 594 The Social and Political Environment of the Firm (4) Focuses on the social and political factors that help shape corporate strategy using stakeholder management as an integrating concept. Topics include corporate governance, corporate political activity, governmental regulation, comparative political economy, and normative aspects of strategic management, including ethics and corporate social responsibility.

School of Dentistry

Dean

Paul B. Robertson
D322 Health Sciences

"The School of Dentistry shares the University's overall mission to generate, disseminate, and preserve knowledge and serve the community. The School is an integral part of the Health Sciences Center and is an oral health care center of excellence serving the people of the state of Washington and the Pacific Northwest. Through its exemplary educational, research, and service programs, the School prepares students to be competent oral health care professionals. Its research programs fundamentally contribute to the understanding of basic biologic processes and behavioral, biomedical, and clinical aspects of oral health. The School values and seeks diversity in its students, staff, faculty, and patient populations. It fosters an environment of mutual respect where objectivity, imaginative inquiry, and the free exchange of ideas can flourish to facilitate personal development, professionalism, and a strong sense of self-worth." (School of Dentistry Mission Statement, July, 1994.)

The School of Dentistry offers courses leading to the degrees of Bachelor of Science with a major in dental hygiene, Doctor of Dental Surgery, Master of Science in Dentistry, Master of Science, and Doctor of Philosophy, as well as postgraduate certificate programs and residency training in specific areas. Opportunities to earn other degrees concurrently (M.S. or Ph.D. in other schools) may be arranged on an individual basis. The School is accredited by the Commission on Dental Accreditation and is a member of the American Association of Dental Schools.

The following departments participate in the curriculum for the School's programs: *Dental Public Health Sciences* is concerned with the social, legal, political, economic, and psychological aspects of dental health-care delivery as well as the epidemiology of oral diseases and the application of biostatistical methods in studying them. *Endodontics* offers training in the diagnosis and treatment of diseases and injuries of the tooth pulp and periradicular tissues. *Oral and Maxillo-facial Surgery* trains students in the procedures used for all types of operations in the oral cavity and all phases of dental pain control. *Oral Biology* encompasses the study of basic biological mechanisms in normal and diseased oral tissues and structures. *Oral Medicine* provides training in diagnostic techniques, so students learn to correlate information gained in various departments and to plan treatment for the patient. *Orthodontics* provides training in the prevention and correction of malocclusion of the teeth. *Pediatric Dentistry* provides students with a broad understanding of the growth and development of the child and teaches students the principles of preventive dentistry, allowing them to develop the skills necessary for maintenance of optimal oral health in children. *Periodontics* offers training relative to the periodontium in health and disease, with emphasis placed on the diagnosis, prevention, and treatment of diseases that affect the periodontium. *Prosthodontics* provides instruction in the fabrication and maintenance of removable, complete, and partial dentures. *Restorative Dentistry* offers training in the restoration or replacement of tooth structure and study of the form and function of the masticatory structures.

Undergraduate Program

Bachelor of Science

The goal of the University of Washington Dental Hygiene Degree Completion Program is to provide postlicensure education that comprises information management, analytic skills, and scientific methodology. This enables graduates to function professionally as dental hygienists who can adapt to new demands. By contrast, the goal of accredited community and technical college associate degree and certificate/diploma prelicensure programs in dental hygiene is to prepare competent clinicians capable of providing dental hygiene clinical services. To qualify for the Bachelor of Science degree with a major in dental hygiene, students must complete the residency, proficiencies, and Areas of Knowledge requirements of the University. Also required is a sequence of three dental hygiene core courses, and one dental hygiene path. The University and affiliated sites provide the settings for projects. Majors may be eligible, following the completion of prerequisite courses, to participate in study abroad programs that focus on oral health issues.

Completion of the required major and University requirements takes one to two years. Students planning to graduate in one year must have a faculty approved plan of study within the first quarter of enrollment. Students planning a two-year program must have a faculty approved plan of study within the first two quarters of enrollment. All students must meet with a program adviser yearly and are encouraged to meet with a program adviser quarterly. The completion of courses that fulfill graduation requirements is the responsibility of the student.

Major Requirements

Core Requirement

Students must complete three courses (9 credits) which form the core of this program. These courses are designed to improve the student's skills in computer access to scientific information, English language usage, and scientific investigative methods. The core courses must be taken in sequence beginning autumn quarter: D HYG 465, D HYG 492, and D HYG 493.

Path Requirement

Students must select at least one of four pathways to fulfill the path requirement. The options are:

Dental Hygiene Care and Education. This path prepares dental hygienists as entry-level teachers who have knowledge of fundamental principles of education and who have experience in dental hygiene management of special populations. Major requirements for this path include a minimum of 12 credits beyond the core: at least 6 in education, of which 2 must be in teaching methods (D HYG 494 or MEDED 520), 2 in evaluation of learning (MEDED 521), and 2 in educational internship (D HYG 595); and 6 in care of special populations, of which 2 must be in ORALM 404 and the remaining either D HYG 404 or approved substitute.

Oral Health Promotion. This path prepares dental hygienists to function as oral health promoters in public health settings. It focuses on national and international health goals and on oral health promotional strategies. Major requirements for this path include a minimum of 10 credits beyond the core: 2 in educational methods (D HYG 494 or MEDED 520), 3 in health care goals and delivery systems (D HYG 402 or approved substitute), 3 in health promotion strategies (D HYG 403 or approved substitute), and 2 in community health agencies (D HYG 404 or approved substitute).

Oral Health Administration. This path is for dental hygienists who want to increase their knowledge of how effective administrators function in complex organizations, or who want to advance their career in marketing, business, or management. Students study organizational theory and administrative behavior, human resources management, resource allocation, systems operations and analysis, marketing, policy formulation, and strategic planning. Major requirements for this path require a minimum of 17 credits beyond the core: 15 in ADMIN 510, and a minimum of 2 in an oral health administration related experience or internship (D HYG 595 or approved substitute).

Biological and Behavioral Sciences. This path is for students seeking entry into a graduate school program or a professional school while earning the Bachelor of Science degree in dental hygiene. Major requirements for this path include: the core, 6 credits in technical writing (T C 400, T C 401, or equivalent), plus a sufficient number of credits for admission eligibility to a graduate or professional degree program.

Academic Standards

The School of Dentistry requires that a minimum numerical grade of 2.5 be earned in dental hygiene courses which are to be counted toward satisfaction of graduation requirements with a dental hygiene major. Graduation with a dental hygiene major also requires a minimum cumulative GPA of 2.00 for all work done in residence at the University. A student whose cumulative GPA falls below 2.00 in any quarter will be placed on academic probation. The status of academic probation shall be removed when the cumulative GPA is 2.00 or above. While on probation, the student must attain at least a 2.50 GPA for each succeeding quarter's work until the cumulative GPA is raised to 2.00.

Admission Requirements

U.S. Applicants. The student must meet the admission requirements and standards of the University. In addition, the student must possess an associate degree or certificate/diploma in dental hygiene from a program accredited by the Commission on Dental Accreditation of the American Dental Association and a license to practice dental hygiene in at least one state.

Other Applicants. The student must meet the admission requirements and standards of the University. The student must possess a certificate or diploma in dental hygiene granted by an officially recognized educational institution. In addition, the student must submit verification that the practice of dental hygiene is authorized by the government of the home country. Students whose native language is not English must submit a score of 580 or higher on the Test of English as a Foreign Language (TOEFL).

Admissions Schedule. Students are admitted into the program summer and autumn quarters. The deadline for transfer and postbaccalaureate applicants to the program and to the University for citizens or permanent residents of the U.S. is April 15. The deadline for submitting an international application to the program and to the University for summer quarter or autumn quarter is March 1.

Application Information. For information on admission criteria and on the application process, contact the Dental Hygiene Program, Box 357440, University of Washington, Seattle, WA 98195-7475; telephone: (206) 543-5820; FAX: (206) 685-4258.

Professional Programs

Doctor of Dental Surgery

The Doctor of Dental Surgery (D.D.S.) curriculum provides opportunities to learn the fundamental principles significant to the entire body of dental knowledge.

Students are expected to learn fundamentals of basic health sciences, to attain proficiency in clinical skills, to develop an understanding of professional and ethical principles, and to develop reasoning and critical decision-making skills that will enable implementation of the dental knowledge base. The first year is divided among lecture, laboratory and preclinical activities in basic sciences, dental anatomy and dental materials. In the second year students develop further preclinical skills, learn how basic science principles are applied to the clinical setting and begin clinical treatment. In the third and fourth years students concentrate on providing clinical treatment, attend lectures which refine technical and diagnostic skills, and participate in electives. Each student is required to take one elective in each of his/her junior and senior year. Electives are chosen by students from courses offered by all departments, including opportunities in independent study, research, seminars on various topics, and specialty clinical topics.

The curriculum extends for 42 months or 14 quarters, including two summer quarters. If needed, students may be allowed additional time to complete required course work.

Admission

To be considered for admission to the School, a student will need to have completed the required courses listed below, have taken the Dental Admission Test, and have attended a personal interview. The School does not select or give preference to a particular undergraduate major field; in fact the Admissions Committee encourages diversity in majors. Courses in the social sciences and the humanities are important and reviewed by the Committee.

The School of Dentistry is state supported and participates in the student exchange program provided by the Western Interstate Commission for Higher Education (WICHE) which supports students from western states without dental schools. Although all applications are carefully reviewed, preference in admission is given to residents of Washington and WICHE states. Required courses are: organic chemistry—2 quarters or 1 semester; biochemistry—2 quarters or 1 semester, physics—3 quarters or 2 semesters; introductory biology or zoology—3 quarters or 2 semesters. Although a majority of students have baccalaureate degrees, students with outstanding academic qualifications may be considered for admission after only three years. The School enrolls a first year class of 50 students. The School is committed to diversity within the dental school student body and the dental community (see Dental Readiness Program below). Equal gender representation also adds to the diversity of the School, and the School encourages women to apply.

Transfer Applicants: The School rarely, and only under exceptional circumstances, admits transfer students from other dental schools.

Foreign Applicants: The School does not provide a special program for foreign trained dentists. Applications from foreign dentists may be considered for entry into the first year class. Foreign applicants whose first language is not English will be required to present TOEFL (Test of English as a Foreign Language) scores of 600 or higher. Also foreign applicants on nonresident visas must submit a written statement from a bank indicating financial support is available to complete the program.

Dental Readiness Program: To increase the number of racially underrepresented students, the School has instituted the Dental Readiness Program. The goals of the Dental Readiness Program are: (1) to correct academic deficiencies of students who have not met the University of Washington School of Dentistry's GPA or Dental Admission Test admission criteria eligibility, (2) to assist students in gaining admission to dental school, (3) to prepare students for successful completion of the predoctoral dental (D.D.S. or D.M.D.) degree. This Program provides entrants with a year of preparation prior to entry into dental school. Entrants

are enrolled in several first year dental courses, as well as study skills seminars, learning method assessment seminars, and other University courses that will strengthen academic background. Entrant's schedules will be unique and be based on individual needs and strengths. A mentor and tutors will be provided as needed. The minimum requirements for eligibility are 2.70 overall GPA, 2.50 predoctoral science GPA, and Dental Admission Test scores of at least 16. The first step of the Program requires the completion of a summer histology course. During the Program year the student must be enrolled in approved courses and receive no 0.0 or withdrawal grades in dental courses, and attain a 2.50 overall GPA in all other coursework in the Dental Readiness Program. The student must complete all courses in the Dental Readiness Program curriculum and make satisfactory progress in order to be admitted to the Doctor of Dental Surgery (D.D.S.) curriculum in the subsequent autumn quarter.

To increase the number of applicants from racially underrepresented groups, the School also participates in, and provides funding for, activities through the Health Sciences Center Office of Minority Students. In addition to academic counseling, this Office sponsors the Minority Students Health Sciences Organization, and manages several grants designed to stimulate interest among minority students in pursuing careers in biomedical research and health science fields. For example, the Minority High School Students Research Apprenticeship Program and the Saturday Academy are funded by a National Institute of Health grant; the Stipends for Training Aspiring Researchers (STAR) Program is funded by the National Institutes for Heart, Lungs and Blood, and the Seattle School District Partnership Program is funded by the Seattle School District. Students from each of these programs interact with School of Dentistry faculty and students, and/or participate in research.

The School has an endowment of \$150,000 from the Warner Lambert Company for a scholarship fund to recruit and retain minority students. In addition the School has established the Karl Åke Ornell Scholarship and the Predoctoral Scholarship to recruit underrepresented students.

The School belongs to the American Association of Dental Schools Application Service (AADSAS). The School has established December 1 as its AADSAS priority filing deadline. Only those applications received in the AADSAS Washington, D.C. office (1625 Massachusetts Avenue NW, Washington, D.C. 20036-2212, phone 202-667-1886; email: aads@aads.jhu.edu) by the priority filing date will be forwarded to the University of Washington for consideration by the Admissions Committee.

Once the School has received the applicant's AADSAS application, the School will send competitive applicants a supplementary application and a request for the following materials:

1. A supplementary application which includes a short autobiographical essay
2. A non-refundable application fee of \$35.00
3. Three letters of recommendation
4. Dental Admission Test scores
5. Transcripts from all higher education institutions attended
6. A list of current and future courses
7. Conviction/Criminal history information (see details below).

The application will be considered complete once all materials noted above are returned. The letters of recommendation should include one from a science instructor who can evaluate the applicant's academic and intellectual qualifications, a second from a health professional (preferably a dentist) who is familiar with the applicant's knowledge of and motivation toward the

dental profession, and the third (character reference) from someone who can indicate the applicant's contribution to the community. If a predoctoral committee exists on the applicant's campus, a combined recommendation from that committee may be used to replace all three recommendations.

Conviction/Criminal History Information: Washington state law now requires that all School faculty, students, and staff disclose background information concerning crimes and offenses against vulnerable populations. A complete copy of the law is available from the School's Office of Student Services and will be forwarded upon request. Applications will not be considered until completed disclosure forms have been returned.

Upon receipt of the completed application, invitations for an interview are sent to applicants based on a preliminary screening of grades and DAT scores. The interview is an opportunity for an open and friendly discussion of the applicant's interests, background, and reasons for selecting dentistry as a profession. The interview allows the applicant to ask questions about the School, faculty, and student life. The interview is conducted by a member of the Admissions Committee. In addition to the interview, the applicant will have an opportunity to talk with a financial aid counselor, meet with enrolled students, take a tour of the School, and meet one of the School's deans.

Following the interview, the Admissions Committee, which is composed of faculty, students, and alumni, will make a decision concerning admission status.

In the Admissions Committee deliberations, the following seven areas are considered, with the first two areas receiving the most weight in assessing the applicant's merits as a candidate:

1. **Grades:** Overall grade-point average (GPA) and GPA of predoctoral required science courses are reviewed. College grades are an important indicator of dental school performance and success. The Committee members review these grades for a strong, consistent GPA with very few withdrawals, incompletes, repeated courses or non-graded options.

2. **DAT (Dental Admission Test):** The test, sponsored by the American Dental Association, covers several areas: quantitative reasoning, survey of natural sciences (including biology, general and organic chemistry) and perceptual ability (including form development, apertures, angles, cubes, and orthographic projections). At the University of Washington the scores are reviewed to identify an applicant's areas of strength. The test must be taken no later than October, one year prior to admission.

3. **Level of Preprofessional Education:** The majority of applicants will have a baccalaureate degree by the time of entry, but admission may be offered to applicants without a baccalaureate degree but only to those who have completed all predoctoral requirements and have an extremely competitive academic record.

4. **Dental Knowledge:** Knowledge of the field of dentistry through experience in a dental setting (dentist's office, clinic, etc.); introductory dental course work; and exploration of the dental literature are considered as admission factors. A qualified applicant will have a clear understanding of the profession and a demonstrated interest in the field.

5. **Unique Life Experiences:** Research and teaching efforts, travel, and work experience are some of the life experiences that are considered important. Such experiences demonstrate the breadth and level of maturity of a candidate.

6. **Personal Attributes:** In addition to motivation, the applicant's poise and communication skills are examined by the Admissions Committee. Personal attributes such as integrity, responsibility, leadership, initiative, community service, perseverance, and diversity of interests are important.

7. Racially Underrepresented Status: Special admissions consideration may be given to applicants who are members of racially underrepresented groups. (See Dental Readiness Program.)

Although interviews begin in October, the earliest the Admissions Committee will notify applicants of their decision is December 1. The School uses a "rolling admission" format, so interviews and Committee decisions will continue to be made between December and March. The Admissions Committee will make one of three decisions regarding all applications:

1. Offer of Acceptance—Admission application has been accepted. The applicant will have a specified time to reply to reserve enrollment in the entering first year class. In addition, enrollment will be contingent on timely submission of the following requirements: required registration deposit; transcripts showing completion of pre-dental courses; physician statement; registration for autumn of the upcoming academic year; completion of required immunizations.

2. Alternate Status—Applicant is offered a position on the Alternate List. The applicant will have a specified time to reserve a position on this list which is maintained until the beginning of the school year.

3. Denial of Admission—The Committee has considered the application but cannot offer a position or alternate status.

Accepted applicants will receive follow up letters and information: Letters detailing registration procedures and providing financial aid information will be sent in June. In late summer, accepted students will receive a packet of materials welcoming them to the School and describing the orientation program, also called Prep Week, which begins on the first day of the School of Dentistry's autumn quarter. Attendance is mandatory and will provide an opportunity for the newly enrolled student to learn about the upcoming curriculum, student rights and responsibilities, financial aid information, student organizations, and other helpful details about dental school. The accepted student will attend an off campus student retreat during Prep Week.

Information regarding the AADSAS application, supplementary application materials, selection criteria, and selection process is available from the University of Washington, School of Dentistry, Office of Student Admissions, Box 356365, D323 Health Sciences, Seattle, WA 98195-6365, email: evrgreen@u.washington.edu, (206) 543-5840 or the Predental Advising Office, 008 Communications, Box 353760, University of Washington, Seattle, WA 98195-3760, email: debbiepf@u.washington.edu, (206) 543-2598. Information on the Dental Admission Test is available from both of the above and the American Dental Association, 211 East Chicago Avenue, Chicago, IL 60611-2678, 1-800-621-8099.

Western Interstate Commission for Higher Education (WICHE): The School participates in the program administered by WICHE for students who reside in Western states not served by a dental school (Alaska, Arizona, Hawaii, Montana, Nevada, New Mexico, and Wyoming). Such students should seek requests for certification from the WICHE commission office in their state of residence. Students who enroll in the School under the WICHE program pay in-state tuition rates, the nonresident portion being paid by the member state that sponsors the student.

Projected costs for 1996-97

	First Year	Second Year	Third Year	Fourth Year
Tuition*	\$8,058	\$10,693	\$10,693	\$8,058
Supplies	3,301	5,302	898	230
Textbooks	834	727	181	0
Misc. Items	217	331	112	518
Total Educational Costs†	\$12,410	\$17,053	\$11,884	\$8,806

* Tuition calculated at 1996-97 schedule for Washington residents at \$2,686 per quarter. For nonresident costs, calculate \$6,824 per quarter. Tuition for summer 1996 is \$2,635 and \$6,698, resident and nonresident, respectively.

† Total Educational Costs do not include living and personal expenses. The estimated costs are noted above. Non-rental instruments belong to the student, so should be considered a long-term investment and not part of the expendable educational costs.

Information on loans and scholarships may be obtained from the Office of Student Services, D323 Health Sciences, Box 356365. Also available in this office is information relating to student life, including the Student Dress Code, Academic Regulations Manual, and Professional Ethics Code.

Graduate Programs

Through their respective departments, the graduate faculty members of the School offer programs leading to the degree of Master of Science in Dentistry, Master of Science, and Doctor of Philosophy, as well as postgraduate certificate programs.

Master of Science in Dentistry/Postgraduate Certificates

Fields of study for the M.S.D. programs are endodontics, oral biology, oral medicine, orthodontics, pediatric dentistry, periodontics, and prosthodontics. Although students may enroll in a graduate certificate program only, students graduating with the M.S.D. will also be awarded a certificate in the specialty. The programs are planned to prepare students to think independently, to evaluate their own services and the literature of the programs, and to develop their clinical skills to a level to permit successful clinical practice, teaching, or research in their chosen specialty. Emphasis is placed on the basic principles of diagnosis and treatment that compose one of the clinician's most valuable assets. The purpose of the programs is not only to train students in the art of their respective specialties but also to encourage possible preparation for academic careers or for research. Research may be undertaken in basic or applied science. Opportunities for collaborative research are available with the cooperation of other colleges, schools, or departments of the University.

Applicants for admission to the M.S.D. and certificate programs must be graduates of a school of dentistry approved by the Commission on Dental Accreditation of the American Dental Association or a university dental school located outside the North American continent whose curriculum and admission requirements are similar to those of the UW School of Dentistry. Applications must be submitted to the appropriate department, on or before the following deadlines: October 1 for oral medicine, orthodontics, periodontics; October 15 for endodontics; November 1 for pediatric dentistry and prosthodontics. A concurrent Application for Admission to the Graduate School also must be filed. International students must submit financial statements before the application deadlines and must demonstrate competency in the English language, for which TOEFL scores are required. Applicants who have not received dental degrees from an institution within the United States will be required to supply Graduate Record Examination scores for admission to the University of Washington Graduate School (graduates of U.S. institutions are not required to submit GRE scores). Requests for information or application forms may be forwarded to the department of the specialty field, School of Dentistry, University of Washington, Seattle, WA 98195-6365.

A minimum of 8 consecutive full-time quarters of residence is required except in the periodontics and prosthodontics programs. Certificate training in periodontics requires a minimum of 12 consecutive full-time quarters of enrollment and may be pursued concurrently with other advanced degrees which may extend the program length. The graduate prosthodontic program requires a minimum of 11 quarters of didactic, clinical care, and research activities.

Postgraduate certificate programs are not administered by the Graduate School, and no thesis is required. The course content may vary somewhat from the M.S.D. program, although the same academic standards are applied in both programs. Tuition and fees are assessed at the graduate level for both programs.

Master of Science, Doctor of Philosophy

Curriculums for the M.S. and Ph.D. programs are offered through the Department of Oral Biology.

Oral biology is concerned with the nature of the oral and paraoral tissues and with the applicability of basic scientific knowledge to oral tissues in health and disease. The courses and research programs in the department deal with the origin, growth and development, structure, and functions of oral tissues, as well as with the etiology and pathogenesis of oral diseases and malfunctions. By its nature, oral biology overlaps the basic medical sciences and clinical dental sciences.

The department contains well-equipped laboratories actively engaged in various aspects of research involving the following approaches: biochemical, including studies on protein synthesis and secretion and the structure of salivary macromolecules, as well as studies on the structural proteins of the cytoskeleton of oral epithelial and epidermal cells; pharmacological, including molecular mechanisms in the regulation of secretion; physiological, including ion fluxes and their control in secretory tissues; microbiological, including the molecular basis of bacterial colonization of oral surfaces, and the identification, taxonomy and pathogenicity of oral pathogens; pathological, including the growth and metastasis of oral tumors; tissue culture, including studies on factors regulating the growth and development of oral epithelial cells; and morphological, including studies on oral tissues at the light and electron microscopic levels.

Several programs are available through the Department of Oral Biology to accommodate students with different educational objectives.

A program of study and research leading to the Doctor of Philosophy degree is available for those students desiring extensive research training as well as in-depth course work in oral biology. In addition to the courses offered by this department, students in the Ph.D. program are expected to gain proficiency in one of the biomedical sciences.

A separate program of study and research leading to the Master of Science degree is available for those students who want less training than the Ph.D. program affords.

A nonthesis option exists in the Master of Science program for the purpose of training dental hygiene educators to instruct in certain basic and applied sciences as well as in the clinic.

For the more clinically oriented students, the School offers a program leading to the degree of Master of Science in Dentistry with specialization in oral pathology. Students enrolled in this program receive training that includes experience in the School's extensive biopsy service, participation in the teaching of oral pathology to dental students, participation in a residency program, and enrollment in a series of advanced courses in general and oral pathology.

Clinical specialty training (e.g., oral pathology, oral medicine, periodontics) can also be obtained in conjunction with either the M.S. or Ph.D. programs.

Applicants for all programs must have either a baccalaureate or professional degree from a dental or medical school. Acceptance into the programs requires approval of both the Department of Oral Biology and the Graduate School. For information or application materials, contact the Graduate Program Adviser, Department of Oral Biology, B224 Health Sciences, Box 357132, University of Washington, Seattle, WA 98195-7132.

United States Public Health Service traineeships may be available to students who are United States citizens or permanent residents. These begin at \$18,600 at the postdoctoral level. An allowance for tuition and fees is normally included. Applicants may also seek support via the individual Dentist-Scientist Awards from the National Institutes of Health, which provide up to five years of stipend support for dental graduates seeking a combined clinical specialty-Ph.D. degree course of study. The M.S. and Ph.D. programs, including the nonthesis M.S. for dental hygienists, are identified as WICHE Regional Graduate Programs, making students from WICHE-participating states eligible to receive support while pursuing these degree programs.

Residency Training

Residency training programs are available in oral and maxillofacial surgery and the general practice of dentistry. Both programs provide for rotation through several of the University-affiliated hospitals. Each is a fully accredited program which grants a certificate upon successful completion of the training. Stipends are provided.

The Oral and Maxillofacial Surgery Program is at least four years in duration and provides broad exposure to all aspects of the practice of oral and maxillofacial surgery. Application, selection, and administration of this training program is provided through the Department of Oral and Maxillofacial Surgery. Further information can be obtained by contacting Dr. O. Ross Belme, Department of Oral and Maxillofacial Surgery, Box 357134, School of Dentistry, University of Washington, Seattle, WA 98195-7134.

The General Practice Residency is a one-year training program that emphasizes the general dentist's role in a hospital and the management of medically, physically, and mentally compromised patients. Application, selection, and administration of the General Practice Residency is provided through the Division of Hospital Dentistry. Further information can be obtained by contacting Dr. Barton S. Johnson, Division of Hospital Dentistry, Box 356365, School of Dentistry, University of Washington, Seattle, WA 98195-6365.

Postdoctoral Fellowships

Postdoctoral training fellowships are available in periodontics and behavioral or public health research in dentistry. Programs vary in duration and many accommodate degree-seeking or research fellows pursuing an academic career. NIH-sponsored full tuition and a stipend for up to three years are provided for U.S. citizens, noncitizen nationals, and those foreign nationals with permanent residency status in the United

States. Members of ethnic minorities and women are especially invited to apply. Application, selection, and administration of the program are provided through the Department of Periodontics and the Department of Dental Public Health Sciences.

Graduate Training in Dental Public Health

Opportunities exist for pursuing graduate degrees in public health which emphasize applications to research in dentistry. Master of Public Health (M.P.H.) programs in the Departments of Epidemiology and Health Services of the School of Public Health and Community Medicine can be pursued in conjunction with postdoctoral training in the School of Dentistry's Department of Dental Public Health Sciences. Didactic course work is taken in the School of Public Health and Community Medicine, augmented with independent study and thesis research on selected topics in the School of Dentistry. Similar opportunities exist for pursuing the Ph.D. in epidemiology with an emphasis on research in dentistry. Further information may be obtained from the Department of Dental Public Health Sciences, Box 357475, School of Dentistry, University of Washington, Seattle, WA 98195-7475.

Dental Hygiene

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

D HYG 402 Global Perspectives in Oral Health (3) Disease patterns and their impact on oral health care delivery systems. Cultural, demographic, economic, and political factors affecting the effectiveness of various systems. Offered: A.

D HYG 403 Oral Health Educational Strategies (3) Planning, preparing, and evaluating educational strategies for oral health promotion. Assessment of needs, development of objectives, creation of communication messages, review of behavioral and educational theories, mechanisms of evaluation. Offered: W.

D HYG 404 Field Experience in Delivery of Oral Health Care (2-12, max. 12) Focuses on healthcare delivery issues: environmental, social, educational, economic, or cultural. Students participate at approved health agencies to learn about societal, ethical, cultural, and client oral healthcare needs and demands. The 2-credit minimum includes 30 hours on-site, end-of-quarter seminar, written assignment, and weekly e-mail communication with faculty. Offered: AWSpS.

D HYG 465 Theoretical and Scientific Basis for Dental Hygiene Practice (3) Lecture-discussion on science, theory, and dental hygiene practice. Focuses on clinical decision making processes and evidence-based learning in management of oral health problems. Includes experience at selected sites. UW library system and computer resources used to search and retrieve information for reports. Prerequisite: dental hygiene major or permission of instructor. Offered: A.

D HYG 475 Orientation to Hospital Dentistry for Dental Hygienists (4) Operation of dental profession within hospital setting. Hospital rounds, surgical observation, participation in emergency dental treatment, clinic operations and management, and clinical dental hygiene. Prerequisite: 465.

D HYG 482 Local Anesthesia for Dental Hygienists (2) Techniques of local anesthesia and initial management of emergencies in the dental office.

D HYG 491 Issues in Professional Education (3) Seminar and discussions on topics influencing dental education. Academic freedom, accreditation,

interdisciplinary relationships, legislation, licensure, tenure.

D HYG 492 Principles of Scientific Investigation for Oral Health Professionals (3) QSR Introduction to principles of scientific investigation, biostatistics and their application to relevant literature. Offered: W.

D HYG 493 Review of Literature for Oral Health Professionals (3) QSR Application of modern methods of library search and critical analysis of relevant literature. Includes technical writing and oral reporting as a means of integrating knowledge and skills acquired in 465 and 492. Prerequisites: 465 and 492 or permission of instructor. Offered: Sp.

D HYG 494 Principles of Teaching for Oral Health Professionals (3) Application of principles of learning to teaching methods and techniques used in education, with opportunity for course planning, demonstration, and practice teaching. Offered: A.

D HYG 497 Directed Studies for Oral Health Professionals (*, max. 14) Based on student interest in special areas. Independent study and tutorial student-faculty relationships. Credit/no credit only. Prerequisite: permission of instructor. Offered: AWSpS.

D HYG 565 Theoretical and Scientific Basis for Dental Hygiene Practice (3) Lecture-discussion on science, theory, and dental hygiene practice. Focuses on clinical decision making processes and evidence-based learning in management of oral health problems. Includes field experience at selected practice sites. UW library system and computer resources used to search and retrieve information essential to making oral and written reports. Offered: A.

D HYG 594 Principles of Teaching for Oral Health Professionals (3) Application of principles of learning to teaching methods and techniques used in education, with opportunity for course planning, demonstration, and practice teaching. Prerequisite: graduate program admission. Offered: A.

D HYG 595 Internship (*, max. 12) Clinical and/or didactic teaching experience or program administration. Teaching and administration responsibilities assigned according to student's previous experience, education needs, and interest. Seminar required. Prerequisites: 494 or 594 and permission of instructor. Offered: AWSpS.

Dental Public Health Sciences

Faculty

Chair

Timothy De Rouen

Professors

Chapko, Michael K. * 1978, (Adjunct Research); PhD, 1972, City University of New York; MPH, 1978, University of Washington; diffusion of health technologies, cost-effectiveness in health care.

Conrad, Douglas A. * 1977; MHA, 1973, University of Washington; MBA, 1977, PhD, 1978, University of Chicago.

De Rouen, Timothy * 1975; PhD, 1971, Virginia Polytechnic Institute & State University; applications of biostatistics to clinical epidemiology of oral and infectious diseases.

Fales, Martha H. * 1959, (Emeritus); PhD, 1978, University of Michigan; dental hygiene.

Milgrom, Peter M. * 1974; DDS, 1972, University of California (San Francisco); management of fearful and phobic dental patients, quality of dental care.

Weinstein, Philip * 1972; PhD, 1971, University of Kentucky; dental behavioral science, treatment and prevention of fear and pain, clinical assessment.

Associate Professors

Beaton, Randal D. * 1976, (Adjunct Research); PhD, 1972, University of Washington; assessment and treatment of temporomandibular joint pain and dysfunction.

Cameron, Cheryl A. 1979; MEd, 1978, University of Kentucky; PhD, 1986, University of Washington; JD, 1994, Seattle University; dental hygiene.

Domoto, Peter K. * 1973, (Adjunct); DDS, 1964, University of California (San Francisco); MPH, 1975, University of Washington; pediatric dentistry, dental behavioral science.

Grembowski, David * 1981; MA, 1975, Washington State University; PhD, 1982, University of Washington; dental care demand, fluoridation, dental health services research.

Ramsay, Douglas S. * 1983, (Adjunct); DMD, 1983, University of Pennsylvania; PhD, 1988, University of Washington; behavioral medicine/dentistry, physiological psychology, orthodontics, pediatric dentistry.

Sharp, Lawrence J. 1962; MA, 1959, PhD, 1964, Washington State University; research methods, statistics.

Wells, Norma J. 1960; MPH, 1966, University of California (Los Angeles); international dental health.

Assistant Professors

Critchlow, Cathy W. 1993; PhD, 1993, University of Washington; epidemiology in dental health, chronic disease as affected by infectious disease.

Karl, Helen W. 1990, (Adjunct); MD, 1976, University of Virginia.

Leroux, Brian * 1991; PhD, 1989, University of British Columbia (Canada); random effect models, stochastic processes, dental research, toxicology.

Instructor

Drangsholt, Mark T. 1985, (Acting); DDS, 1984, University of Washington.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

DPHS 201 Planning a Career in Dentistry for the Future (2) Future-oriented overview of important concepts in dental science, contemporary modes of patient treatment, and dental-care delivery systems. Provides firsthand exposure to practice of dentistry and prerequisite materials in oral anatomy, epidemiology, and other basic sciences subjects. Open to all second-, and third-year undergraduate students. Prerequisite: health sciences immunizations. Offered: Sp.

DPHS 448P Directed Studies in Dental Public Health Sciences (*) Students and faculty with common academic interests pursue them together within the curriculum by means of independent study and a tutorial student-faculty relationship. Credit/no credit only. Prerequisite: permission of instructor. Offered: AWSpS.

DPHS 610 Social and Historical Perspectives in Dentistry (2) Examines dental care problems involving biological, behavioral, and community elements and has student develop hypotheses regarding nature and complexity of problem, set objectives, seek resources and information, and contribute to development of outcomes. Offered: A.

DPHS 635P Scientific Literature in Clinical Decision Making (1) Introduction to critical reading of individual articles in professional journals and integrating the findings of several articles. Use of the literature

to assist the practicing dentist in making clinical decisions. Offered: Sp.

DPHS 541P Ethics in Dentistry (1) Seminar improving ethical reasoning skills and conveying ethical and legal standards of the profession. Credit/no credit only. Offered: W.

DPHS 550P Directed Studies in Dental Public Health Sciences (*, max. 6) Students and faculty members who have common academic interests can pursue them together within the curriculum by means of independent study and a tutorial student-faculty relationship. Credit/no credit only. Offered: AWSpS.

DPHS 588 Biostatistics in Dentistry (3) Introduction to concepts and methods of descriptive and inferential statistics, with applications in dentistry emphasized. Topics include comparison of means and proportions, hypothesis testing, confidence intervals, non-parametric methods, linear regression, and correlation. Prerequisite: enrollment in School of Dentistry or permission of instructor. Offered: jointly with BIOS 510. Offered: S.

DPHS 589 Clinical Epidemiology and Study Design in Dentistry (3) An introduction to epidemiological methods as they relate to dental research. Topics covered include the estimation of dental disease occurrence at patient level and site level and the design and analysis of clinical trials with special emphasis on designs unique to dentistry, such as split-mouth designs. Credit/no credit only. Offered: S.

DPHS 575 Behavioral Dental Research (1) Survey of behavioral science research and methodology in dentistry and related fields. Emphasis in various quarters varies: literature review, research design, instrumentation, data analysis. Designed for advanced students who plan a research career. Credit/no credit only. Prerequisite: doctoral degree or permission of instructor. Offered: AWSpS.

DPHS 640P Professional Issues: Clinical Management of the Fearful and Phobic (1) Introduction to assessment process and treatment strategies for successful management of anxious, fearful, or phobic patient, combined with clinical observation of diagnostic and treatment appointments of active patients. Offered: AWSpS.

DPHS 680 Dental Fear Clinic (2) Clinical instruction in the care of the severely anxious or phobic adult or child. Strategies from behavioral and cognitive psychology. Credit/no credit only. Prerequisite: graduate standing in dentistry or permission of instructor. Offered: AWSpS.

Dentistry

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

DENT 520P Clinical Practice Management 1 (1) Designed to provide the student with the knowledge required to manage a patient pool during the clinical program and in future dental practice including: obtaining a patient pool, authorized treatment planning, patient management in accordance with professional codes, risk management strategies, patient financial account management, and contemporary biohazardous materials guidelines. Offered: S.

DENT 523 Prevention and Management of Medical Emergencies in Dentistry (1) Introduction to medical emergencies in the dental office, including cardiopulmonary resuscitation. Offered: A.

DENT 534P Geriatric Dentistry (1, max. 2) Special needs of older persons seeking dental care: oral

health, psychology of aging, socioeconomic problems, effective communications, dental management, special problems in home health care, and problems with institutional and long-term care. Credit/no credit only. Offered: WSpS.

DENT 537P Hospital Dentistry (1) Introductory course presenting hospital procedures and protocol and specific patient types. Offered: Sp.

DENT 540 Introduction to Dental Implants (2) Introduction to dental implant technology and treatment. Offered: S.

DENT 545 Review of Medical Emergencies and Basic Life Support (1) Review of medical emergency management in dentistry, including prevention and treatment. Review and update basic life support and airway management. Offered: S.

DENT 550P Special Studies in Dentistry (*, max. 12) Series of courses offered by the various departments from which students may elect study in areas of special interest to them. These courses include subject matter applicable to all phases of dentistry. Credit/no credit only. Offered: AWSpS.

DENT 551P, 552P, 553P, 554P, 555P, 556P, 557P Clinical Practice Management 2 (1, 1, 1, 1, 1, 1) Designed to provide the student with the experience required to manage a patient pool during the clinical program and in future dental practice including: obtaining a patient pool, treatment planning, patient management in accordance with professional codes, risk management strategies, patient financial account management, and contemporary biohazardous materials guidelines.

DENT 561 Elective in Forensic Odontology (1) Elective opportunity in forensic odontology. Offered: SpS.

DENT 562 Elective Offering in Advanced Cardiac Life Support (2) Basics of advanced cardiac life support. Offered: A.

DENT 563 Elective Offering in Intravenous Sedation (2-5) Provides didactic and clinical training in the management of patients utilizing intravenous sedation. Offered: AWSpS.

DENT 565 Dental Photography (2) Provides student with sufficient knowledge and experience to select and use correct photographic equipment for photographing patients (facial and interoral), casts, instruments, x-rays, charts, and objects. Offered: A.

DENT 588 Biostatistics and Research Design (2) Instruction in basic biostatistics, emphasizing the integration of statistics with research design and including measures of central tendency, regression, correlation, Chi-square, and comparison of samples. Credit/no credit only. Offered: S.

DENT 640P Extramural Clinics in Geriatric Dentistry (2) Extramural geriatric clinical experience, including choice of hospital, nursing home, community clinic, and brief didactic component. Offered: AWSpS.

DENT 645P Hospital Rotation (2) Clinical experience that puts into practice the material presented in 537P. The student is involved in hospital procedures and protocol and in dental care of the hospital patient. Offered: AWSpS.

DENT 650P Extramurals (*, max. 12) Extramural sites arranged to provide dental students, at varying levels of their education, with opportunities to treat a wide variety of patients in the delivery systems outside the school. Credit/no credit only. Prerequisite: permission of instructor. Offered: AWSpS.

DENT 651P Anesthesia Rotation (6) 1.5-month rotation in anesthesia at one of three local hospitals. Objectives: administration of anesthesia, manage-

ment of emergency situations and airway problems, familiarization with pharmacology of anesthetic drugs; increased efficiency with venipuncture. Credit/no credit only. Offered: AWSpS.

DENT 652P Clinical Medicine Clerkship (4) One-month clinical rotation in clinical medicine at a local hospital. Objective is to increase the student's ability in physical evaluation of patients as well as to give in-depth knowledge of hospital procedures and commonly prescribed medications. Credit/no credit only. Offered: AWSpS.

DENT 655 Medical Emergency Management: Basic Life Support (1) Review of principles and practical applications for the management of medical emergencies in dental practice in conjunction with training and certification in Basic Life Support. Offered: AWSpS.

DENT 657 Comprehensive Clinic (1-10) Clinical comprehensive care for patients. Offered: S.

DENT 659 Comprehensive Clinic (1-10) Clinical comprehensive care for patients. Offered: S.

DENT 660 Temporomandibular Joint Diagnosis and Treatment (2, max. 8) Seminar and clinic sequence for comprehensive examination, diagnosis, and treatment of patients with temporomandibular joint problems. Includes management of dysfunction and morphologic alterations in associated muscles and occlusion. Prerequisite: permission of instructor. Offered: AW.

DENT 700 Master's Thesis (*) Offered: AWSpS.

Endodontics

Faculty

Chair

Gerald W. Harrington

Professors

Byers, Margaret R. * 1972, (Adjunct Research); PhD, 1969, Harvard University; somatosensory receptor structure, cytochemistry, and pathologic reactions; neuroimmune interactions.

Guild, Robert E. 1951, (Emeritus); PhD, 1955, University of Washington.

Harrington, Gerald W. * 1969; DDS, 1959, St Louis University; MSD, 1969, University of Washington; endodontics.

Natkin, Eugene * 1962, (Emeritus); DDS, 1957, New York University; MSD, 1962, University of Washington; endodontics.

Oswald, Robert J. * 1974, (Clinical); DDS, 1969, Virginia Commonwealth University; endodontics.

Associate Professor

Pitts, David Leroy * 1977; DDS, 1972, Indiana University; MSD, 1977, University of Washington; endodontics.

Senior Lecturer

Steiner, James C. * 1992; DDS, 1956, Case Western Reserve University; MSD, 1966, University of Washington; normal sensory mechanisms of human dental pulp and pathologic alterations causing pain.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

ENDO 520P Introduction to Endodontics (2) Lecture course dealing with the differential diagnosis and the treatment of pulp pathosis and associated periapical pathosis. This course also deals with criteria and procedures for the evaluation of success and failure of endodontic treatment.

ENDO 531P Endodontic Technique (4) Lecture-laboratory course in root canal therapy in terms of present-day concepts. Treatment of extracted teeth as practice for clinical cases.

ENDO 534P Endodontics (1) Lecture course dealing with diagnosis and treatment of endodontic emergencies, surgical management of endodontic problems, and clinical procedures particular to endodontics. Offered: W.

ENDO 535P Clinical Management of Endodontic Treatment Problems (1) Management of a variety of technical problems frequently encountered in the treatment of endodontic cases and the diagnosis and treatment of impact injuries to teeth. Offered: Sp.

ENDO 545 Honors Endodontics (2, max. 4) Seminar discussions of advanced endodontic diagnosis and treatment planning issues as well as clinical sessions on treatment of calcified negotiable canals, alternate instrumentation procedures and anterior endodontic surgery. Offered: WSp.

ENDO 550P Directed Studies in Endodontics (*, max. 6) See DPHS 449 for course description and prerequisite.

ENDO 560 Advanced Endodontic Diagnosis and Treatment (2) Current concepts are presented and discussed relating to the diagnosis and treatment of pulpal and periapical pathosis. Criteria for evaluation of success or failure of root canal therapy are presented. Offered: W.

ENDO 562 Advanced Endodontic Treatment Planning (2) Diagnosis and treatment of acute symptoms of dental origin, surgical endodontic therapy, traumatic dental injuries, and the relationship between periodontal and pulpal pathosis, including differential diagnosis and appropriate treatment planning, are discussed. Offered: Sp.

ENDO 563 Radiographic Interpretation (2) Various aspects of radiographic interpretation of particular relevance to endodontics, including interpretation of normal structures, acquired and developmental abnormalities, infections, alveolitis, dysplasias, and cysts. Offered: A.

ENDO 566 Advanced Radiographic Interpretation (2) Various aspects of radiographic interpretation of particular relevance to endodontics, including malignant lesions, benign tumors, various diseases other than tumors, soft-tissue calcifications, and radiographic technique. Offered: W.

ENDO 580, 581, 582, 583, 584, 585, 586, 587 Endodontic Seminar (2, 2, 2, 2, 2, 2, 2) Continuous weekly seminar devoted to review of endodontic and related literature and discussion of research methods.

ENDO 590 Treatment Planning Seminar (2, max. 16) Weekly seminar to discuss controversial treatment problems and difficult diagnostic cases.

ENDO 593 Clinical Practice Teaching (1, max. 3) Closely supervised experience in teaching clinical endodontics to the undergraduate dental student.

ENDO 597, 598 Endodontics Teaching Seminar (2, 2) Weekly seminars devoted to an examination of general problems of teaching and learning and specific problems of endodontics teaching.

ENDO 600 Independent Study or Research (*) Prerequisite: permission of graduate program adviser.

ENDO 630P Clinical Endodontics (1-, max. 7) Student is required to complete endodontic treatment of anterior, premolar, and molar teeth. In addition to conservative treatment of several endodontic cases, the student assists in a periapical surgery. Student must complete at least six quarters of 630P and all course requirements before any grade is awarded.

ENDO 658P Endodontics Extended Learning (*, max. 4) Supplemental work in endodontics to correct an area of student deficiency. Credit/no credit only.

ENDO 660 Clinical Endodontics (4, max. 32) Clinical diagnosis and treatment of pulpal pathosis and related sequelae.

Oral Biology

Faculty

Chair

Murray Robinovitch

Professors

Altman, Leonard * 1974, (Clinical); MD, 1969, Harvard University; mechanisms of tissue injury produced by bacteria, leukocytes, or toxins.

Binder, Marc D. * 1978, (Adjunct); PhD, 1974, University of Southern California; organization of spinal reflexes.

Dale-Crunk, Beverly A. * 1972; PhD, 1968, University of Michigan; keratin biochemistry.

Eyre, David R. * 1985 (Adjunct); PhD, 1969, University of Leeds (UK); connective tissue biology, collagen chemistry, bone and cartilage metabolism.

Herring, Susan W. * 1990, (Adjunct); PhD, 1971, University of Chicago; vertebrate functional morphology, relations between muscular function and skull growth.

Izutsu, Kenneth * 1971; PhD, 1970, University of Washington; salivary gland physiology and pathophysiology.

Keller, Patricia J. * 1955, (Emeritus); PhD, 1953, Washington University; protein structure and function.

Robinovitch, Murray * 1966; DDS, 1961, University of Minnesota; PhD, 1967, University of Washington; salivary biochemistry and saliva-bacterial interactions.

Tamarin, Arnold * 1961, (Emeritus); DDS, 1951, University of Illinois; MSD, 1961, University of Washington; oral embryology and histology, electron microscopy.

Verdugo, Pedro * 1974, (Adjunct); MD, 1965, State University of Chile; microrheology, biomechanics, polymer gel physics, laser spectroscopy, cell biology.

Watson, Eileen L. * 1972; PhD, 1970, University of Utah; salivary gland pharmacology and regulation.

Associate Professors

Anderson, Leigh C. * 1988; DDS, 1977, PhD, 1979, University of Minnesota; salivary gland physiology, neural and hormonal regulation of secretion.

Lamont, Richard J. * 1988; PhD, 1985, University of Aberdeen (UK); pathogenic mechanisms and taxonomy of oral bacteria.

Lee, Minako Y. * 1977, (Adjunct Research); MD, 1963, Tokyo Women's Medical College (Japan); hematopoiesis and osteoclast development.

Morton, Thomas H. * 1975; DDS, 1972, Creighton University; MSD, 1975, University of Washington; oral pathology, oral medicine.

Oda, Dolphine * 1985; BDentS, 1975, University of Baghdad; MSc, 1981, University of Manitoba (Canada); transformation and differentiation of cultured oral epithelial cells.

Wells, Norma J. 1960, (Adjunct); MPH, 1966, University of California (Los Angeles); international dental health.

Assistant Professors

Cangelosi, Gerard A. * 1985, (Adjunct); PhD, 1983, University of California (Davis); molecular biology of tuberculosis.

Presland, Richard B. 1989, (Research); PhD, 1987, University of Adelaide (Australia); molecular basis of epithelial cell differentiation.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

ORALB 449 Undergraduate Research Topics in Oral Biology (*) Individual research on topics selected in collaboration with a faculty member. Credit/no credit only. Prerequisite: permission of instructor. Offered: AWSpS.

ORALB 510P Development, Structure, and Function of Oral Tissues (3-3) Development, microscopic and submicroscopic structure, functional aspects of hard and soft oral tissues. Embryonic development of head and neck; morphodifferentiation of face and oral structures. Structure-function relationships in descriptions of development and histology-ultrastructure of oral tissues by integration of traditional oral histology and oral physiology topics. Offered: WSp.

ORALB 519 Immunology (1) General immunology for dental students. Offered: Sp.

ORALB 520P Molecular Microbiology and Oral Diseases (3) Applies students' background knowledge in basic sciences to an understanding of the molecular bases of the interactions between microorganisms and oral tissues that lead to plaque formation and dental diseases. Principles of clinical asepsis and diagnosis of caries and periodontal diseases also covered. Offered: A.

ORALB 521P, 522P Oral Pathology (3, 3) Survey of the diseases of the oral-facial regions in lecture and laboratory sessions. Among the conditions discussed are diseases of teeth and their supporting structures and diseases of the oral and paraoral soft tissues and bones. Correlations between clinical findings, etiologic factors, and histopathologic features are stressed. Attendance in the laboratory is required. Offered: A, W.

ORALB 540P Clinical Oral Pathology Conference (2) Seminar stressing basic science aspects and clinical findings of various oral lesions through exploration of etiology, pathogenesis, histopathology, and treatment modalities for oral pathology cases drawn from files of the Division of Oral Pathology. Offered: A.

ORALB 550P Directed Studies in Oral Biology (*, max. 12) Selected readings and seminars on a topic chosen by individual arrangement in collaboration with a faculty member. Credit/no credit only. Prerequisite: permission of instructor. Offered: AWSpS.

ORALB 560 Dental Plaque and Oral Disease (3) Series of lectures and review of current literature pertaining to the formation and microbiological and biochemical characteristics of dental plaque, and the relationship, etiologically, of dental plaque to dental caries, periodontal disease, and the sequelae of these conditions. Offered: A.

ORALB 561 Oral Tissue Development, Structure, and Function (2, max. 4) Review of current biological

literature relevant to clinical practice of dentistry. Topics include cellular and molecular aspects of embryonic development of head and neck, teeth, and other oral structures, pulp biology, epithelial differentiation, bone metabolism, and salivary glands. Correlation of function and form emphasized. Prerequisite: permission of instructor. Offered: WSp.

ORALB 562 Supervised Teaching in Oral Biology (1-5, max. 10) Directed and guided experience in selected topics in teaching techniques, teaching philosophy, and course design of courses given by the Department of Oral Biology. Students are required to participate in lecture and laboratory teaching under the supervision of the course director. Prerequisite: permission of instructor. Offered: AWSp.

ORALB 565 Clinical Oral Pathology (1-3, max. 10) Presentation of interesting oral lesions from the dental school and the University of Washington Medical Center and the correlation of the clinical findings with the underlying morphologic and biochemical changes in the tissues. The relation of these oral lesions to systemic disease is stressed. Primarily designed for students with DDS, MD, or DVM degrees. Prerequisite: permission of instructor. Offered: AWSpS.

ORALB 566 Surgical Oral Pathology (2-4, max. 16) Students are trained to interpret microscopic slides of lesions from the oral cavity and related areas, and to correlate these with the clinical findings. Each student is responsible for the grossing of specimens and the preparation of histology reports. Primarily designed for students with DDS, MD, or DVM degrees. Prerequisite: permission of instructor. Offered: AWSpS.

ORALB 568 Biomineralization (2) Ontogeny, microscopic, and submicroscopic organization and chemistry of bones and teeth in mammals. Mineral metabolism, crystallographic structure, mechanical properties, and experimental models of biomineralization. For graduate students and advanced students in dentistry and medicine; senior undergraduates with permission of instructor.

ORALB 569 Periodontal Microbiology (2) Viral, bacterial classification; physiology; toxicity mechanisms reviewed. Formation and composition of plaque and calculus, and chemical methods of control discussed. Specific microbial floras of acute and chronic gingivitis, early onset forms of periodontitis, and adult periodontitis studied. Principles of antibiotic use reviewed. Offered: jointly with PERIO 574; A.

ORALB 570 Seminar in Oral Pathology (1-3, max. 9) Consists of in-depth studies of specific oral diseases through use of seminar and discussion. Students are required to present literature reviews and to act as discussion leaders. Primarily designed for students with DDS, MD, or DVM degrees. Prerequisite: permission of instructor. Offered: AWSpS.

ORALB 572 Oral Pathology (5) Survey of the diseases of the oral facial regions in lecture and laboratory sessions. Diseases of teeth and their supporting structures and diseases of the oral and paraoral soft tissues and bones. Correlations between clinical findings and histopathologic features. Attendance in the laboratory is required. Offered: AW.

ORALB 574 Clinical Stomatology (3) Diseases of the oral cavity and jaw are presented as the practitioner encounters them—detailed clinical pictures, laboratory tests, radiographic findings, surgical exploration for the establishment of a therapeutic diagnosis. Offered: Sp.

ORALB 575 Oral Biology Seminar (1-3, max. 10) Presentation and discussion of current research problems by members of the staff, investigators from other departments in the University, visiting scientists, and trainees. Prerequisite: permission of instructor. Offered: AWSp.

ORALB 576 Molecular Aspects of Epithelial Biology (2) In-depth discussion of cytoskeleton, cell junctions, influence of growth factors, retinoids, and other exogenous agents on differentiation and function of normal stratified epithelia. Prerequisite: BIOCH 440 (or equivalent) or permission of instructor. Offered: alternate years; A.

ORAL B 577 Applied Therapeutics in Dentistry (2) Practical information about drugs included in practice of dentistry. Topics include evaluation of case histories, dental considerations pertaining to medical conditions and drug therapies, types of drugs and dosages used for common medical conditions, the pharmacology of drugs prescribed by the clinician, and the mechanisms involved in drug interactions. Offered: A.

ORALB 578 Research Techniques in Oral Biology (2-4, max. 15) Introduction to biochemical, analytical, or morphological techniques employed in biochemical cytology or molecular pathology as well as *in vitro* techniques of tissue and organ culture. Prerequisite: permission of instructor. Offered: AWSpS.

ORALB 581-582-583 Secretory Process in Exocrine Glands ([1-3]-[1-3]-[1-3]) Biostructural, physiological, and biochemical aspects of individual secretory systems as integrated units. Faculty members with appropriate expertise participate in discussions and presentations during each of the three quarters. Offered: A-W-Sp.

ORALB 600 Independent Study or Research (*) Prerequisite: permission of instructor. Offered: AWSpS.

ORALB 700 Master's Thesis (*) Offered: AWSpS.

ORALB 800 Doctoral Dissertation (*) Offered: AWSpS.

Oral and Maxillofacial Surgery

Faculty

Chair

Philip Worthington

Professors

Beirne, Owen Ross 1985; DMD, 1972, Harvard University; PhD, 1976, University of California (San Francisco); oral and maxillofacial surgery.

Gehrig, John D. * 1954, (Emeritus); DDS, 1946, MSD, 1951, University of Minnesota; oral and maxillofacial surgery, biological structure.

Kiyak, H. Asuman * 1972; MA, 1974, PhD, 1977, Wayne State University; geriatric dentistry, behavioral aspects of health care.

Myall, Robert W. * 1977; BDentS, 1964, University of London (UK); MD, 1975, University of British Columbia (Canada); oral and maxillofacial surgery and biological structure.

Worthington, Philip 1976; MD, 1956, BDentS, 1962, University of Liverpool (UK); oral and maxillofacial surgery.

Associate Professors

Bloomquist, Dale S. * 1972; DDS, 1969, University of Washington; oral and maxillofacial surgery.

Egbert, Mark A. 1982; DDS, 1981, University of Washington; oral and maxillofacial surgery.

Assistant Professors

Dawson, Kerineth 1993; BDS, 1983, University of Sydney (Australia); MDSc, 1993, University of Melbourne (Australia); oral and maxillofacial surgery.

Evans, John R. 1982; DDS, 1975, University of Washington; oral and maxillofacial surgery.

Instructor

Rubens, Brian C. 1990, (Acting); DDS, 1980, University of Washington; oral and maxillofacial surgery.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

O S 520P Local Anesthesia (2) Pharmacology, physiology, anatomy, and techniques of local anesthesia for dental students.

O S 530- Oral Surgery: Didactic (1-, max. 3) Covers the scope of oral and maxillofacial surgery as practiced in the United States today. Introductory course for predoctoral dental students.

O S 532P Sedation and Pain Control (2) Techniques of sedation (oral, inhalational, intravenous) and pain control.

O S 550P Directed Studies in Oral Surgery (*, max. 16) See DPHS 449 for course description and prerequisite.

O S 560 Dental Sedation (2) For graduates of the various dental specialties on the theory, application, and techniques of dental sedation. All forms of sedation, including oral, intramuscular, intravenous, and inhalation, are covered. Clinical experience is provided in the second half of the quarter.

O S 630P- Oral Surgery Clinic (2-, max. 6) Clinical experience in simple and complex dentoalveolar and pre-prosthetic surgery. A problem-based course using an auto-tutorial approach covering the extraction of teeth, impaction surgery, medications, surgical complications, treatment of infections, bone cysts, maxillary sinus complications, and salivary gland and mucosal pathology.

O S 651P Harborview Clerkship (2-10) Six-week rotation at Harborview Medical Center, including intensive instruction in oral surgery procedures and observing and assisting oral and maxillofacial surgery in the operating room. Credit/no credit only. Prerequisite: permission of department Chairperson.

O S 652P Smith Hospital, Texas, Rotation (2-12) Six-week rotation at John Peter Smith Hospital in Fort Worth, Texas, including intensive instruction in oral surgery procedures and observing and assisting oral and maxillofacial surgery in the operating room. Credit/no credit only. Prerequisite: permission of department Chairperson.

Oral Medicine

Faculty

Chair

Edmond L. Truelove

Professors

Dworkin, Samuel F. * 1974; DDS, 1958, PhD, 1969, New York University; dentistry and clinical psychology, pain, psychosomatic and illness-related behavior.

Hollender, Lars Gosta 1988; DDS, 1958, Royal Dental School (Sweden); PhD, 1964, University of Lund (Sweden); oral radiology.

Izutsu, Kenneth * 1971; PhD, 1970, University of Washington; salivary gland physiology and pathophysiology.

Omnell, Karl-Åke * 1981; DDS, 1950, Royal Dental School (Sweden); DO, 1957, University of Lund (Sweden); oral radiology.

Truelove, Edmond L. * 1972; DDS, 1967, MSD, 1971, Indiana University; oral medicine, orofacial pain, stomatitis, and salivary gland disorders.

Associate Professors

Chasteen, Joseph E. 1989; DDS, 1967, University of Michigan.

Le Resche, Linda A. * 1983, (Research); DSc, 1977, Johns Hopkins University; nonverbal behavior (facial expression) related to pain; pain epidemiology.

Morton, Thomas H. * 1975; DDS, 1972, Creighton University; MSD, 1975, University of Washington; oral pathology, oral medicine.

Schubert, Mark M. * 1974; DDS, 1974, MSD, 1981, University of Washington; oral medicine/oral oncology.

Stefel, Doris * 1972, (Emeritus); DDS, 1954, University of Washington; dental education in oral health care of persons with disability.

Assistant Professors

Martin, Michael D. * 1986; DMD, 1979, University of Kentucky; MPH, 1989, PhD, 1993, University of Washington; dental education in oral health care of persons with disability.

Massoth, Donna L. 1993, (Research); DDS, 1983, University of California (Los Angeles); MSD, 1985, PhD, 1992, University of Washington; chronic pain, illness behavior, somatization.

Middaugh, Dan 1967; DDS, 1961, University of Minnesota; MPA, 1972, University of Washington; oral medicine.

Moore, Rodney A. 1993, (Research); DDS, 1973, Ohio State University; PhD, 1991, Royal Dental College, Aarhus (Denmark); illness behavior.

Persson, Rigmor E. 1991, (Research); DDS, 1969, University of Lund (Sweden); MSD, 1989, University of Washington; oral health, geriatric and medically compromised patients, general dentistry.

Wilson, Leanne 1991, (Research); PhD, 1988, University of Washington; clinical and developmental psychology, behavioral patterns associated with illness and chronic pain.

Instructor

Drangsholt, Mark T. 1985, (Acting); DDS, 1984, University of Washington.

Lecturers

Griffith, Mickaela V. 1984; DDS, 1960, University of Tehran (Iran).

Rumberg, Hester 1989; DDS, 1983, University of Washington.

Sommers, Earl E. * 1972; DDS, 1971, Indiana University; diagnosis/management of orofacial pain, stomatitis, and salivary gland disorders.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

ORALM 404 Considerations in Care of the Patient With a Disability (*, max. 6) Role of auxiliaries in dental treatment of the special patient, including psychosocial issues, communication techniques,

wheelchair transfers; dental prevention, medical and dental management of specific disabilities; drug therapy, sedation, and anesthesia. Prerequisite: permission of instructor. Offered: AWSpS.

ORALM 460 Clinical Management of Patients With Disabilities (*, max. 10) Participation in chair/bedside dental treatment of a broad range of disabled populations, including homebound and institutionalized patients. Prerequisites: 404, permission of instructor. Offered: AWSpS.

ORALM 465 Dental Care of the Disabled Literature Review (1) Review of the current scientific literature pertaining to disability issues, research, clinical management, resources, and legislation relating to oral health of persons with disabilities. Credit/no credit only. Offered: AWSpS.

ORALM 525P, 526P, 527P Detection and Management of Systemic and Oral Disease I, II, III (1, 2, 1) Clinical presentation of diseases of oral cavity and appropriate treatment conditions. Offered: A, W, Sp.

ORALM 528 Problem Oriented Case Planning (2) Basic concepts of treatment planning. Offered: S.

ORALM 529 Physical Diagnosis (1) Techniques and methods for examination and analysis of patient needs. Offered: S.

ORALM 530 Normal and Abnormal Growth and Development: Dental Education in Care of the Disabled (3) Introduction to acquired and developmental disabilities and dental management considerations of patients with disabilities. Offered: S.

ORALM 531P, 532P, 533P Acute and Chronic Orofacial Pain (1, 1, 2) Essential clinical and technical information and skills for diagnosis and treatment of acute and chronic pain, including differential diagnosis, and behavioral factors. Offered: A, W, Sp.

ORALM 540P Oral Medicine Senior Seminar (2) Clinical conference devoted to case presentations of patients with dental treatment needs and complicating medical problems. Offered: AW.

ORALM 545P- Clinical Conference in Oral Medicine (1-, max. 2) Clinical pathologic conference utilizing interdisciplinary approach to patient care and emphasizing basic science application. Offered: AW.

ORALM 547, 548, 549 Dental Practice Administration (2, 2, 2) Material essential to persons entering dentistry in a time of rapid change in health care systems, including practice management, career opportunities, and starting out in a private practice. Offered: A, W, Sp.

ORALM 550P Directed Studies in Oral Diagnosis (*, max. 12) See DPHS 449 for course description and prerequisite. Offered: AWSpS.

ORALM 560 Advanced Diagnostic Techniques (2) Advanced diagnostic procedures used to identify oral and perioral diseases. Included are in-depth discussions of history analysis, methods for psychologic evaluation, soft and hard tissue diagnostic procedures, neurologic, salivary gland, and other tissue analyses requiring special procedures. Offered: AWSpS.

ORALM 564 Dental Care of the Disabled I (*, max. 10) Advanced topics in rehabilitation dentistry including psychosocial issues; characteristics and needs of patients with specific disabilities; patient management and use of portable equipment; drug therapy, sedation and anesthesia; dental prevention, and emergency procedures. Seminars and self-directed study. Prerequisite: permission of instructor. Offered: AWSpS.

ORALM 565 Oral Medicine Clinical Conference (*, max. 16) Clinical conference in which diagnostic data concerning patients seen in the oral medicine clinic are presented for evaluation. When possible, the

patient is present with laboratory findings, radiographs, and the results of special tests. Offered: AWSpS.

ORALM 567 Behavioral Management of Acute and Chronic Orofacial Pain (2) Overview of psychosomatic concepts, as related to acute and chronic pain. Behavioral management strategies for acute and chronic pain integrated into clinical care provided by primary dentist. Review biofeedbacks, relaxation, hypnosis, placebos, and related psychophysiological approaches. Open to graduate students, postdoctoral fellows, residents in dentistry, medicine, psychology. Offered: AWSpS.

ORALM 570- Oral Medicine and Therapy (2-, max. 6) Lecture directed toward the presentation and discussion of oral diseases and oral manifestations of systemic disease. Primarily the clinical manifestations' relationship to generalized disease processes and patient management with in-depth discussions of therapy. Offered: AWSpS.

ORALM 576 Oral Medicine Literature Review (1) Seminar analyzes the recent literature concerning the area of oral medicine, diagnosis, and therapy for oral disease. Offered: AWSpS.

ORALM 578 Dental Care of the Disabled Literature Review (1) Review of the current scientific literature pertaining to disability issues, including research, clinical management, resources, and legislation pertaining to oral health of persons with disabilities. Credit/no credit only. Offered: AWSpS.

ORALM 580 Current Concepts in Oral Radiology (2) Lecture/seminar covering current concepts in oral radiology including technical factors, radiation risks, observer characteristics and variation, radiographic localization, interpretation, and overview of current extraoral techniques. Offered: AWSpS.

ORALM 584 Dental Care of the Disabled III (*, max. 10) Field practice in community outreach to facilities and agencies serving disabled populations. Includes observation, dental screenings, patient education and in-service training of direct care staff. Prerequisite: 404 or 664. Offered: AWSpS.

ORALM 600 Independent Study or Research (*) Credit/no credit only. Offered: AWSpS.

ORALM 601 Oral Medicine Research Seminar (1, max. 10) Presentation and discussion of current research problems by graduate students, faculty, and investigators from other departments in the university. Credit/no credit only. Prerequisite: permission of instructor. Offered: AWSpS.

ORALM 630P- Clinical Diagnosis and Oral Medicine (1- or 2-, max. 3) Opportunity for examining, performing x-ray survey, and planning treatment for less-involved patients. Students also participate in rendering diagnosis and emergency treatment. Offered: AWSpS.

ORALM 640- Advanced Clinical Diagnosis and Oral Medicine (1- or 2-, max. 3) Advanced instruction in diagnosis and in the examination and handling of patients. Students are in block assignment and perform radiographic surveys, oral diagnosis, and treatment plans for prospective patients. Offered: AWSpS.

ORALM 650P Oral Medicine Clinical Elective (1-6) Opportunities for students to work in various clinical activities at local hospitals or other sites outside the school. Credit/no credit only. Prerequisite: permission of instructor. Offered: AWSpS.

ORALM 660 Rotations in Medical Disciplines (1-4, max. 24) Clinic, oriented to the hospital practice of oral medicine, deals with examination and nonsurgical therapy of hospital patients. The conditions treated include primary oral diseases, oral manifestations of systemic diseases, and oral defects resulting from

medical treatment of serious systemic disease. Credit/no credit only. Offered: AWSpS.

ORALM 663 Introduction to Educational Methods in Dentistry (2) Principles of teaching and learning, their applications in dental education. Basic principles include learning theory and cognitive processing, identifying prerequisite knowledge of learners, determining objectives of outcomes of learning, selecting appropriate methods and materials, using evaluation procedures. Increases understanding of instruction process to provide a sound foundation for teaching. Offered: AWSpS.

ORALM 664 Dental Care of the Disabled II (*, max. 10) Practicum in chair/bedside delivery of dental care to different disabled populations. Includes rotations to institutions, long-term care facilities, and homebound service, using mobile equipment. Prerequisites: 564 and permission of instructor. Offered: AWSpS.

ORALM 665 Clinical Oral Medicine (*, max. 33) Clinic involving the diagnostic evaluation of patients with difficult and unusual oral diseases. The student diagnoses and treats the patient. Types of therapy include medications and chemical agents, functional physical therapy, and counseling. Offered: AWSpS.

ORALM 670 Clinical Oral Medicine Teaching (1-4, max. 16) Clinic designed to give the student experience and instruction in the teaching of clinical oral diagnosis. Treatment of emergency dental problems as well as routine and special diagnostic procedures is emphasized. Offered: AWSpS.

Orthodontics

Faculty

Acting Chair

Susan W. Herring

Professors

Artun, Jon 1988; DDS, 1969, University of Oslo (Norway); MSD, 1979, Norwegian Dental Association; PhD, 1987, University of Oslo (Norway); orthodontics.

Herring, Susan W. * 1990; PhD, 1971, University of Chicago; vertebrate functional morphology, relations between muscular function and skull growth.

Kokich, Vincent G. * 1974; DDS, 1971, MSD, 1974, University of Washington; orthodontics: craniofacial growth and development, sutural morphogenesis, premature sutural fusion.

Little, Robert M. * 1974; DDS, 1966, Northwestern University; MSD, 1970, PhD, 1974, University of Washington; orthodontics.

Moffett, Benjamin C. * 1964, (Emeritus); PhD, 1952, New York University; anatomy.

Moore, Alton W. 1948, (Emeritus); DDS, 1941, University of California (San Francisco); MS, 1948, University of Illinois; orthodontics.

Newell, Laura L. * 1957, (Adjunct); PhD, 1967, University of Washington; primatology growth and development, human biology, evolutionary aspects of dermatoglyphics.

Shapiro, Peter A. * 1977; DDS, 1970, Howard University; MSD, 1973, University of Washington; craniofacial biology, longterm evaluation of orthodontic treatment.

Associate Professors

Joondeph, Donald R. * 1971; DDS, 1967, MS, 1969, Northwestern University; orthodontics.

Ramsay, Douglas S. * 1983; DMD, 1983, University of Pennsylvania; PhD, 1988, MSD, 1990, University of Washington; behavioral medicine/dentistry, physiological psychology, orthodontics, pediatric dentistry.

Assistant Professor

Bollen, Anne-Marie 1993; DDS, 1984, University of Brussels (Belgium); MSD, 1986, PhD, 1990, University of Michigan; orthopaedics.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

ORTHO 449 Directed Studies in Orthodontics (*) See DPHS 449 for course description and prerequisite. Credit/no credit only. Offered: AWSpS.

ORTHO 520P Craniofacial Growth and Development in Orthodontic Diagnosis and Treatment (4) Basic principles of pre- and postnatal growth and development integrated with the recognition, analysis, and treatment planning of problems encountered in dental and skeletal malocclusions. Offered: Sp.

ORTHO 522P Beginning Adjunctive Orthodontics (2) Lecture/laboratory instruction in indications for, and techniques of, simple orthodontic tipping, rotational and extrusive movements, as well as orthodontic study model fabrication. Prerequisite: 520P. Offered: S.

ORTHO 550P Directed Studies in Orthodontics (*, max. 6) See DPHS 449 for course description and prerequisite. Offered: AWSpS.

ORTHO 551 Review of Selected Literature in Orthodontics (1) Students select a topic for review, review appropriate literature, and prepare written critique. Offered: AWSp.

ORTHO 552 Journal Club (1) Predoctoral students join graduate students in review of current orthodontic literature. Offered: AWSp.

ORTHO 560 Orthodontics Seminar (1-5, max. 25) Methods of diagnosis, analysis, and treatment planning of malocclusion; analysis of methods and theoretical principles used in the treatment of malocclusion. The student presents a detailed case analysis and plan of treatment for each clinical patient supervised. Offered: AWSpS.

ORTHO 562, 563, 564, 565, 566, 567 Orthodontic Theory (2, 2, 2, 2, 2, 2) Lecture-seminar sequence dealing with interpretation and application of orthodontic principles and concepts. Pertinent literature, research findings, and current orthodontic theory are analyzed in depth. Offered: AWSpS.

ORTHO 570 Roentgenographic Cephalometry (2) Basic principles, history, and techniques of roentgenographic cephalometry. Offered: AS.

ORTHO 575 Post-Retention Seminar (1, max. 2) Each student is required to locate three or more former orthodontic patients who qualify as at least ten years postretention. Complete orthodontic records must be obtained, analyzed, and discussed in the seminar. Instructor critiques the presentation and offers similar or contrasting cases for comparison. Offered: WSp.

ORTHO 580 Orofacial Biology (* max. 8) Three-quarter sequence pertaining to craniofacial anatomy, development, and function. Summer quarter is combined lecture/laboratory on clinical and functional anatomy and may be taken separately. Autumn and winter quarters are lecture/seminars on development, growth, and function. Outside reading assignments by the students are discussed and critiqued during sessions. Offered: AWS.

ORTHO 582 Adult Orthodontics Seminar (2) Seminar for orthodontic, periodontic, and restorative dentistry graduate students in comprehensive, integrated diagnosis and treatment planning of the dental problems of the adult patient. Offered: AWSpS.

ORTHO 585 Surgical Orthodontic Diagnosis and Treatment Planning (3) Seminar and clinic for orthodontic graduate students and oral surgery residents in comprehensive, integrated diagnosis, and treatment planning for patients with major facial deformities. Offered: AWSpS.

ORTHO 584 Clinical Management of Cleft Lip and Palate and Craniofacial Anomalies (2) Management of these complex patients involves members of a dedicated, highly specialized multidisciplinary team. Insight gained into specific evaluation and treatment modalities of each discipline through lectures, seminars, assigned readings. Integrated approach to management is illustrated by attendance at craniofacial staffing and clinics. Prerequisite: graduate students in orthodontics. Offered: AW.

ORTHO 587 Management of Debilitated Dentitions (1-, max. 2) Integrated diagnosis and treatment planning for patients with edentulous spaces, emphasizing use of osseointegrated implants. Offered: AW.

ORTHO 589 Applied Psychology in Orthodontics and Pediatric Dentistry (1) Application of psychological theories, research, and intervention strategies to orthodontics and pediatric dentistry. Topics include the principles of behavior change, patient compliance with therapeutic regimens, and motivations for orthodontic treatment. Prerequisite: graduate standing in dentistry or permission of instructor. Offered: A.

ORTHO 590 Scientific Methodology in Dental Research (2) Review of the scientific method. Evaluation of dental literature. Discussion of proposed master's degree research projects. Formulation and discussion of hypothetical research projects related to orthodontics. Offered: W.

ORTHO 597 Preclinical Technique (1) Techniques of construction and manipulation of the edge-wise arch mechanism. Offered: AWS

ORTHO 598 Archwire Formation (1) Principles of wire bending and the use of orthodontic pliers. Offered: AS

ORTHO 599 Biomechanics (1) Principles of biological reactions to application of orthodontic forces. Offered: S.

ORTHO 600 Independent Study or Research (*) Managing the experimental protocol. Data collection and analysis. Preparation and writing of a thesis or publishable manuscript. Prerequisite: permission of instructor. Offered: SpS.

ORTHO 630P- Orthodontic Clinic (1-, max. 6) Direct clinical application of principles of orthodontic diagnosis and treatment planning for simple orthodontic appliances to modify tooth position in preparation for definitive restorative and/or periodontal therapy. Prerequisite: 522P. Offered: ASpS.

ORTHO 660P Clinical Orthodontics (1-6, max. 24) Clinical application of the techniques in the treatment of malocclusion. Offered: AWSpS.

ORTHO 682 Adult Orthodontics Clinic (1) Clinic for orthodontic graduate students in the treatment of the dental problems of the adult patient. Offered: AWSpS.

Pediatric Dentistry

Faculty

Chair

Peter K. Domoto

Professors

Lewis, Thompson M. * 1955, (Emeritus); DDS, 1950, Northwestern University; MSD, 1955, University of Washington; pediatric dentistry.

Weinstein, Philip * 1972, (Adjunct); PhD; 1971, University of Kentucky; dental behavioral science, treatment and prevention of fear and pain, clinical assessment.

Associate Professors

Davis, John M. * 1967; DDS, 1961, MSD, 1967, University of Washington; pediatric dentistry.

Domoto, Peter K. * 1973; DDS, 1964, University of California (San Francisco); MPH, 1975, University of Washington; pediatric dentistry, dental behavioral science.

Leggott, Penelope J. * 1993; BDentS, 1969, University of Bristol (UK); MSc, 1980, University of Illinois; pediatric dentistry.

Peterson, Devereaux * 1982; PhD, 1980, University of Pittsburgh; pedodontics, educational administration, and dental treatment for medically compromised patients.

Ramsay, Douglas S. * 1983; DMD, 1983, University of Pennsylvania; PhD, 1988, University of Washington; behavioral medicine/dentistry, physiological psychology, orthodontics, pediatric dentistry.

Lecturer

Williams, Bryan J. 1991; DDS, 1974, Western Ontario University (Canada); MSD, 1979, University of Washington; pediatric dentistry, orthodontics.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

PEDO 520P Pediatric Dentistry (4) Introduction to clinical pediatric dentistry, including behavior management, oral diagnosis, preventive dentistry, dental anomalies, radiography, anesthesia, restorative procedures, pulpal therapy, interceptive orthodontics, and traumatic dental injuries of the child patient. Offered: S.

PEDO 523P Communication Skills I (1) Introductory communication skills with emphasis on interviewing, presented in seminar format. Credit/no credit only. Offered: A.

PEDO 524P Communication Skills II (1) Continuation of basic communication skills. Credit/no credit only. Offered: A.

PEDO 525P Management of Pediatric Patient Behavior (1) Introduction to selected theories of child development and application in dental setting; pediatric cognitive, affective, and social development and introduction to problematic child behaviors; use of social systems approach to overview child psychosocial development for the dentist. Credit/no credit only. Offered: W.

PEDO 550P Directed Studies in Pediatric Dentistry (*, max. 6) See DPHS 449 for course description and prerequisite. Offered: S.

PEDO 560 Introduction to Pediatric Dentistry (1) Preclinical course covering fundamentals of primary care in pediatric dentistry, including emergencies, prevention, diagnosis and treatment planning, and infection control. Offered: S.

PEDO 570, 571, 572, 573, 574, 575, 576, 577 Pediatric Dentistry Seminar I, II, III, IV, V, VI, VII, VIII (2, 2, 2, 2, 2, 2, 2, 2) Series of seminars covering principles and theory of child development and behavior management for pediatric patient, including sedation, general anesthesia, and principles of informed consent, pathology of oral manifestations of diseases of children and adolescents, pediatric radiology, and use of computers in didactic, clinical, and research endeavors, and the scientific basis for the prevention and treatment of dental caries, periodontal disease, and developmental anomalies. Offered: S, A, W, Sp, S, A, W, Sp.

PEDO 580, 581, 582, 583 Developmental Disabilities Seminar (1, 1, 1, 1) Multidisciplinary approach to managing children with developmental disabilities. Offered: S, A, W, Sp.

PEDO 600 Independent Study or Research (*) Prerequisite: permission of instructor. Offered: AW.

PEDO 630P- Clinical Pediatric Dentistry (1-, max. 7) Educational experiences in comprehensive clinical pediatric dentistry. Students register third and fourth years for 24 sessions in the pediatric dentistry clinic, a 3-day rotation at a community clinic, computer assisted clinical simulations, behavioral change projects, and a written analysis of videotaped patient/student clinic encounters. Offered: AWSpS.

PEDO 650P Pediatric Dentistry Extramurals (1-6) Clinical extramurals in the field of children's dentistry. Prerequisite: permission of instructor. Offered: AWSpS.

PEDO 660P, 661P, 662P, 663P, 664P, 665P, 666P, 667P Clinical Pediatric Dentistry (1-3, 1-3, 1-3, 1-3, 1-3, 1-3, 1-3) Clinical courses involving treatment of pediatric patients, especially those with special needs. Offered: S, A, W, Sp, S, A, W, Sp.

PEDO 668 Clinical Clerkship in Pediatric Dentistry: Yakima Valley (* max. 5) Comprehensive dental care for economically-disadvantaged children in a rural community health center. Offered: AWSpS.

PEDO 669 Supervised Clinical Teaching (1-3) Supervision of predoctoral dental students in pediatric dentistry patient care. Offered: AWSpS.

PEDO 670, 671, 672, 673, 674, 675, 676, 677 Hospital Pediatric Dentistry (1-3, 1-3, 1-3, 1-3, 1-3, 1-3, 1-3) Diagnosis, management, and treatment of patients with disabilities in Children's Hospital Dental Clinic. Offered: S, A, W, Sp, S, A, W, Sp.

PEDO 680, 681, 682, 683, 684, 685, 686, 687 Pediatric Dentistry under General Anesthesia (1-4, 1-4, 1-4, 1-4, 1-4, 1-4, 1-4) Clinical course involving preoperative assessment of comprehensive dental treatment under general anesthesia and follow-up care. Offered: S, A, W, Sp, S, A, W, Sp.

PEDO 690, 691, 692, 693, 694, 695, 696, 697 Craniofacial Anomalies Clinic (1-4, 1-4, 1-4, 1-4, 1-4, 1-4, 1-4) Multidisciplinary clinic in which children with craniofacial anomalies are evaluated and complex treatment plans developed and assessed. Offered: A, W, Sp, S, A, W, Sp, S.

PEDO 699 Pediatric Orthodontic Clinic (1-4) Clinical orthodontic care for pediatric patients. Offered: AWSpS.

Periodontics

Faculty

Chair

Gosta Rutger Persson

Professors

Ammons, William F. * 1970, (Emeritus); DDS, 1959, University of Texas (Houston); MSD, 1970, University of Washington; periodontics.

Dale-Crunk, Beverly A. * 1972; PhD, 1968, University of Michigan; keratin biochemistry.

Johnson, Robert H. * 1981; DDS, 1962, McGill University (Canada); MSD, 1964, Indiana University; periodontics.

Lukehart, Sheila A. 1980, (Adjunct Research); PhD, 1978, University of California (Los Angeles); infectious diseases.

Page, Roy C. * 1967; DDS, 1957, University of Maryland; PhD, 1967, University of Washington; connective-tissue pathology, chronic inflammation, immunopathology, periodontal disease.

Persson, Gosta Rutger * 1985; DDS, 1967, PhD, 1978, University of Lund (Sweden); diagnosis of periodontal diseases and the consecutive process of clinical decision making.

Robertson, Paul B. * 1992; DDS, 1966, MS, 1972, University of Alabama; host-bacterial interactions in the etiology and pathogenesis of the periodontal diseases.

Robinovitch, Murray * 1966, (Adjunct); DDS, 1961, University of Minnesota; PhD, 1967, University of Washington; salivary biochemistry and saliva-bacterial interactions.

Wilkinson, Raymond F. 1984, (Acting); DDS, 1963, MS, 1970, Ohio State University.

Associate Professors

Bordin, Sandra * 1981, (Research); PhD, 1966, University of Ferrara (Italy); regulation of connective tissue repair by immune-inflammatory complement components.

O'Neal, Robert B. 1995; DMD, 1971, University of South Carolina; MEd, 1971, Wayne State University; periodontics.

Assistant Professors

Johnson, Bradley D. * 1982, (Research); DDS, 1982, University of Washington; DDS, 1983, University of California (Los Angeles); PhD, 1992, University of Washington.

Weinberg, Aaron * 1991; DMD, 1981, PhD, 1990, Hebrew University (Israel); molecular pathogenesis of gram-negative anaerobic bacteria involved in periodontal diseases.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

PERIO 449 Directed Studies in Periodontics (*) See DPHS 449 for course description and prerequisite.

PERIO 525P-526P Prevention/Periodontics (2-2) Overview of preventive dentistry, introduction to periodontal therapy. Offered: WSp.

PERIO 527P Introduction to Periodontics (1) Epidemiology, natural history, etiology, and histopathology of various periodontal diseases. Offered: S.

PERIO 530P, 531P Principles of Periodontics (2, 2) Diagnosis of periodontal diseases and development of a treatment plan including maintenance program, rationale for non-surgical, surgical, and antibacterial management of periodontal diseases. Discussion of principles of various periodontal procedures. Prerequisites: 525-526 and 527. Offered: A, W.

PERIO 542 Advanced Periodontics (1) Designed to improve the understanding of sequencing of patient care and providing periodontal therapy into the perspective of a comprehensive care system. Offered: Sp.

PERIO 550P Directed Studies in Periodontics (*, max. 6) See DPHS 449 for course description and prerequisite.

PERIO 561- Periodontal Case Management (2-, max. 8) Didactic presentation of clinical periodontics to provide a comprehensive view of the field and a grasp of modern therapeutics.

PERIO 565 Periodontal Surgical Anatomy (2) Lecture and dissection course in intraoral anatomy (maxilla and mandible only) from a periodontal surgical approach. Prerequisite: graduate standing in periodontics. Offered: S.

PERIO 566 Practice Management (1) Aspects of setting up and administering a private periodontal practice. Financing, insurance, office design, equipment, employees, professional forms, marketing strategies, and patient management. Prerequisite: 561. Offered: S.

PERIO 567 Oral Medicine Case Studies (1, max. 3) Weekly seminar discussing series of unknown oral and perioral conditions. Discussion of history taking, differential diagnoses, relevant tests, therapeutic approaches, and outcomes. Offered: AWSp.

PERIO 574 Periodontal Microbiology (2) Viral, bacterial classification; physiology; toxicity mechanisms reviewed. Formation and composition of plaque and calculus, and chemical methods of control discussed. Specific microbial floras of acute and chronic gingivitis, early onset forms of periodontitis, and adult periodontitis studied. Principles of antibiotic use reviewed. Offered: jointly with ORALB 569; A.

PERIO 575 Immunologic Aspects of Oral Diseases (2) Lecture course designed to acquaint students with basic concepts of immunology and immunopathology. Topics include cellular immunology, antibody structure and function, complement system, immunopathologic mechanisms, tumor immunology and immunologic manifestations in mucocutaneous oral lesions as well as immunology of caries and periodontal disease. Offered: W.

PERIO 576 The Molecular and Cellular Biology of the Periodontium (2) Nucleic acid, protein, and carbohydrate biochemistry reviewed. Roles of collagens and proteoglycans in gingival tissues and the organization of oral epithelia discussed. Structures of human and animal periodontal lesions compared. Cellular and molecular inflammatory and immunological mechanisms in periodontal disease discussed. History, classification, and epidemiology of periodontal diseases described. Offered: Sp.

PERIO 577 Review of Literature (2, max. 16) Concise review of the scientific periodontal literature with specific focus on studies of periodontal diagnosis, wound healing, periodontal regeneration, microbiology, and implant procedures.

PERIO 582- Periodontic Treatment Planning Seminar (1-, max. 12) Weekly seminar involved with the presentation, discussion, and tentative solution of moderate to complex problems in diagnosis and treatment.

PERIO 585- Periodontal Therapy Seminar (1-, max. 12) Weekly seminar utilizing the case review method and dealing with the treatment of moderate to advanced periodontal disease.

PERIO 586- Longitudinal Evaluation of Periodontal Therapy (1-, max. 9) Close examination of case progress from initial therapy to most recent maintenance visits to determine efficacy of method, demands upon patient, and temporal effect of therapy and survival. Preparation and delivery of a lecture on a therapeutic modality.

PERIO 587 Periodontal Diseases Research Seminar (1, max. 12) Weekly seminar devoted to advances in periodontal research. Topics include research design, methodology, and data derived from recent and/or ongoing periodontal research. Credit/no credit only. Offered: WSp.

PERIO 592 Prescription Surgery (1-1-1) Clinical course in periodontal surgery in which surgical procedures are performed on prescription basis for patients undergoing therapy in the undergraduate dental clinic. Exposes student to a wider spectrum of patients and to stimulate an environment in which the student can encounter the problems in communication and patient management that occur in the private sector.

PERIO 600 Independent Study or Research (*) Prerequisite: permission of graduate program adviser.

PERIO 620P Introduction to Clinical Periodontics (1) Clinical periodontics, with emphasis on examination and assessment.

PERIO 630P-631P-632P Periodontics (1-1-1) Students diagnose periodontal disease and plan and perform periodontal therapies, treating patients in a stepwise manner, describing clinical conditions, and integrating periodontal therapy in a comprehensive plan of care. Prerequisites: 525-526 and 527.

PERIO 640P-641P-642P Advanced Clinical Periodontics (1-1-1) Maintenance and treatment of patients with more complex periodontal involvement. Development of skill in comprehensive treatment planning and execution by the individual student. Allowance made for surgical periodontics and experience in assisting in the treatment of advanced cases. Offered: A, W, Sp.

PERIO 659P Periodontics Extended Learning (*, max. 4) Supplemental work in periodontics to correct an area of student deficiency. Credit/no credit only.

PERIO 660- Clinical Periodontics (2-6-, max. 60) Clinical experience in diagnosis and treatment of periodontal disease.

PERIO 662 Stomatology Clinic (1, max. 4) The diagnosis and treatment of oral and perioral lesions including history taking, biopsies, hematological laboratory tests and chemotherapy. Periodontal therapy in medically compromised patients in the hospital setting. Microscopic review of biopsy specimens. Offered: AWSpS.

PERIO 663 Pre-Prosthodontics Clinical Periodontics (*) Clinical diagnosis and treatment of periodontal disease for nonperiodontics student. Prerequisite: permission of department chairperson.

PERIO 665 Clinical Practice Teaching (*) Supervised experience in teaching clinical periodontics to undergraduate dental students.

PERIO 685 Hospital Periodontics (1) Preparation in periodontics to practice in hospital situations, including experience in operation of nitrous oxide analgesia, general anesthesia, intravenous premedication, treatment of out- and inpatients.

Prosthodontics

Faculty

Chair

L. Brian Toolson

Professors

Bolender, Charles L. * 1959; DDS, 1956, University of Iowa; removable prosthodontics.

Brudvik, James S. * 1979; DDS, 1957, University of Minnesota; removable prosthodontics.

Frank, Richard P. * 1971; DDS, 1962, University of Iowa; MSD, 1968, University of Washington; removable prosthodontics.

Palmer, John M. * 1952, (Emeritus); PhD, 1952, University of Michigan; disorders of voice and orofacial deformities, anatomy of speech.

Smith, Dale E. * 1972, (Emeritus); DDS, 1952, University of Pittsburgh; MSD, 1962, University of Washington; removable prosthodontics.

Associate Professors

Faine, Mary P. 1982; MS, 1975, University of Washington; nutrition.

Rubenstein, Jeffrey E. * 1989; DMD, 1975, Tufts University; maxillofacial and implant prosthodontics.

Toolson, L. Brian * 1970; DDS, 1967, MSD, 1977, University of Washington; removable prosthodontics.

Assistant Professor

Nabadalung, Darunee 1992; DDS, 1984, University of Texas (Houston); maxillofacial prosthodontics and oncology.

Lecturer

Phillips, Sandra L. 1988; MPA, 1985, University of Washington.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

PROS 510P Introduction to Dental Nutrition (3) Basic principles of normal human nutrition, including nutrient requirements at various ages, assessment of nutritional status, nutritive values of foods, with special emphasis on the role of diet in development and maintenance of oral tissues.

PROS 520P Introduction to Complete Dentures—Lecture (3) Didactic course in the treatment of completely edentulous patients. Instruction is provided in diagnostic procedures, complete denture construction, and maintenance care.

PROS 521P Management of Immediate Denture Patients (1) Lecture course describing and illustrating the clinical management of immediate denture patients (typical and overdenture). Offered: S.

PROS 523P Removable Partial Denture Design (2) Lectures in the basic principles of removable partial denture design. Practical drawings and more advanced designs are discussed in seminars. Certain technical aspects of design procedures are done in the classroom. Offered: W.

PROS 525P Removable Partial Denture Clinical Preparatory Course (4) Lecture-laboratory course dealing with those procedures the dentist must perform in order to fabricate a physiologically acceptable removable partial denture. The student gains experi-

ence via clinically simulated laboratory exercises prior to beginning prosthodontic treatment of a partially edentulous patient.

PROS 542P Special Topics In Prosthodontics (1) Lecture describing and illustrating the following topics: implant procedure, management of difficult patients, maxillofacial prosthesis, quality-control problems in private practice, and other special topics. Offered: W.

PROS 550P Directed Studies In Prosthodontics (*, max. 6) See DPHS 449 for course description and prerequisite.

PROS 580 Complete Dentures (2) Lecture/seminar devoted to the diagnosis and treatment of the completely edentulous patient and the immediate denture patient, with emphasis on management of patients with difficulties in treatment. Offered: A.

PROS 582 Removable Partial Dentures (2) Lecture/seminar concentrating on factors peculiar to fabrication of removable partial dentures, with emphasis on management of combined fixed and removable therapy. Offered: W.

PROS 583 Maxillofacial Prosthetics I (1) Introductory lecture/seminar series with emphasis on diagnosis and prosthodontic rehabilitative treatment of patients who have experienced trauma or have congenital or acquired defects in the oral region. Offered: S.

PROS 584 Maxillofacial Prosthetics II (1) Introductory lecture series focusing on the prosthodontic rehabilitation of patients with loss and compromise of facial anatomy, i.e., ocular, orbital, nasal, auricular, combination intraoral/extraoral, and other related facial deformities.

PROS 571 Review of Literature Seminar (1, max. 12) Continuous weekly seminar devoted to the review of prosthodontic and related literature.

PROS 572 Special Topics Related to Prosthodontics (1) Lecture-seminar series focusing on relating principles of basic science to clinical application in prosthodontics. A wide and varied range of topics including surgery, psychology, speech, pharmacology, practice management, physiology, temporomandibular/myofascial joint dysfunction.

PROS 600 Independent Study or Research (*) Prerequisite: permission of graduate program adviser.

PROS 620P- Clinical Complete Dentures (1/3) Basic principles of complete denture fabrication and of diagnosis and treatment of completely edentulous patient. In second quarter student completes denture patient care, provides follow-up treatment, and participates in four competency examinations. Offered: AW.

PROS 621P Complete Denture Prosthodontics (1) Clinical course using the didactic material presented in 620P. The student manages a second complete-denture patient during Winter Quarter with less supervision than in 620P, and also provides follow-up care to the 620P and 621P patients during Winter Quarter and Spring Quarter.

PROS 630P Clinical Prosthodontics (1, max. 3) Clinical course involving the diagnosis and management of completely and partially edentulous patients. Removable partial dentures and immediate dentures are fabricated. Follow-up care provided for patients previously treated.

PROS 640P Clinical Prosthodontic Maintenance (1, max. 3) Clinic involving additional patient treatment with complete, partial, or intermediate dentures, plus indirect relines, managing adjustment chair, peer review, recall clinic, and follow-up care for patients previously treated. Offered: AWP.

PROS 650P Extramurals In Prosthodontics (*, max. 12) Elective clinical experiences or clinical practice teaching. Credit/no credit only. Prerequisite: permission of instructor.

PROS 660 Clinical Prosthodontics (2, max. 6) Practical application of material covered in 560 and 562.

PROS 663 Clinical Maxillofacial Prosthetics I (1-1) Clinical/laboratory providing exposure to treatment of maxillofacial prosthetic patients.

PROS 664 Clinical Maxillofacial Prosthetics II (1-1) Clinical/laboratory expanding upon 663, including extensive patient treatment.

PROS 665- Clinical Practice Teaching (1-, max. 4) Supervised experience in teaching clinical prosthodontics to the undergraduate dental student.

Restorative Dentistry

Faculty

Chair

Bruce R. Rothwell

Professors

Canfield, Robert C. * 1951, (Emeritus); DDS, 1951, University of Washington; restorative dentistry.

Hamilton, A. Ian * 1949, (Emeritus); DDS, 1936, University of Toronto (Canada); MA, 1958, University of Washington; PhD, 1968, University of London (UK); restorative dentistry.

Hodson, Jean Turnbaugh * 1952, (Emeritus); MS, 1958, University of Washington; restorative dentistry.

Johnson, Glen H. * 1980; DDS, 1978, University of Washington; instruction, clinical trials and laboratory research with dental bio-materials.

Morrison, Kenneth N. * 1948, (Emeritus); DDS, 1943, University of Toronto (Canada); MSD, 1952, University of Washington; restorative dentistry.

Nicholls, Jack I. * 1985; PhD, 1966, Purdue University; dental materials.

Warnick, Myron E. * 1956; DDS, 1955, University of Alberta (Canada); restorative dentistry.

Westrum, Lesnick E. * 1966, (Adjunct); MD, 1963, University of Washington; PhD, 1966, University College, London (UK); neuroanatomy, synaptology, plasticity, olfactory and trigeminal systems, dental pathways.

Yuodelis, Ralph A. * 1963, (Emeritus); DDS, 1955, University of Alberta (Canada); MSD, 1964, University of Washington; restorative dentistry, prosthodontics, periodontics.

Associate Professors

Bales, David J. 1983; DDS, 1957, University of Washington; MSD, 1972, Indiana University; restorative dentistry.

Chasteen, Joseph E. 1989, (Adjunct); DDS, 1967, University of Michigan.

Ostlund, Lyle E. 1972, (Emeritus); DMD, 1947, University of Oregon; PhD, 1993, Johns Hopkins University; restorative dentistry.

Powell, Lauri Virginia 1986; DMD, 1982, University of Mississippi; restorative dentistry.

Rothwell, Bruce R. 1980; DMD, 1973, University of Oregon; MSD, 1977, University of Washington; general dentistry, hospital-based dentistry, forensic dentistry.

Assistant Professors

Aw, Tar C. 1995; DDS, 1990, Northwestern University; MS, 1995, University of Michigan; neural networks for decision making in dentistry.

Butson, Timothy J. 1992, (Acting); DMD, 1982, University of Pennsylvania; MSD, 1992, University of Washington; restorative dentistry, fixed prosthodontics.

Hazleton, Lance 1995; DMD, 1983, University of British Columbia (Canada); MSD, 1995, University of Washington; prosthodontics.

Johnson, Barton S. 1991; DDS, 1985, MS, 1989, University of California (Los Angeles); hospital-based dentistry, molecular biology cancer research.

Lepe, Xavier 1993; DDS, 1980, University of Guadalajara (Mexico); MS, 1987, Loyola University (Chicago); restorative dentistry, dental materials.

Instructor

Hage, Abbie D. 1993, (Acting); DDS, 1993, University of Washington; hospital-based dentistry.

Senior Lecturer

McCoy, Richard B. 1992; DDS, 1961, University of Washington; MS, 1973, Loma Linda University; restorative dentistry.

Lecturers

Anderson, J. Martin 1981; DDS, 1965, University of Washington; restorative dentistry.

Kay, Michael A. 1988; DDS, 1987, Northwestern University; hospital-based dentistry.

Libman, Warren J. 1990; DDS, 1986, McGill University (Canada); MSD, 1990, University of Washington; restorative dentistry, fixed prosthodontics.

Nieman, Robert K. 1980; DDS, 1979, University of Washington; hospital-based dentistry.

Stoddard, James W. 1965; DDS, 1961, University of Washington; restorative dentistry.

Townsend, John D. 1978; DDS, 1967, McGill University (Canada); MSD, 1973, University of Washington; restorative dentistry, fixed prosthodontics, periodontics.

Weaver, James D. 1970; DDS, 1965, Ohio State University; restorative dentistry, prosthodontics.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

RES D 410 Dental Anatomy (3) Lecture and laboratory exercises on the morphology and nomenclature of individual human adult and primary teeth. Introduction to function, internal tooth morphology, and the influence of tooth anatomy on selected clinical procedures. For dental hygiene students; others by permission of associate dean.

RES D 449 Directed Studies in Restorative Dentistry (*) See DPHS 449 for course description and prerequisite. Offered: AWSpS.

RES D 510P Introduction to Dental Materials (2) Physical and chemical properties of dental materials. Offered: A.

RES D 511P Applied Dental Materials (4) Lecture/laboratory in use of dental materials relative to restorative dentistry. Clinical application and student self-evaluation of laboratory work emphasized. Offered: W.

RES D 515P Dental Anatomy (3) Lecture and laboratory on the morphology and nomenclature of individual teeth of the adult human dentition. Introduction to tooth histology and function and the influence of tooth anatomy on clinical dental procedures. Offered: A.

RES D 516P Introduction to Occlusion (3) Lecture/laboratory in the functional determinants of occlusal morphology. Preparation and waxing techniques for developing opposing quadrants by the additive waxing technique. Offered: W.

RES D 517P Functional Analysis of Occlusion (3) Clinical and laboratory experiences in examination and charting of patient's occlusion, record-taking for analysis of occlusion on a dental articulator, and preclinical diagnostic correction of problems of occlusion on articulated clinical casts. Provides basic background or technique information relative to laboratory and clinical experiences. Offered: Sp.

RES D 519P Operative Dentistry (1) Lecture series introducing operative dentistry. Nomenclature, cavity classification, instrumentation, pulp protection, and principles of cavity preparation. Offered: Sp.

RES D 520P, 521P, 522P, 523P Introduction to Operative Dentistry Technique (3, 3, 3, 2) Introduces processes of restoring diseased or damaged tooth structure to proper health, form, function, and esthetics. Emphasis on basic principles of cavity preparation, preparation and restoration design, proper selection and use of restorative materials, and clinical considerations for restorative treatment planning. Following demonstration of competence in didactic and practical aspects. Limited opportunity available for introduction to restorative care. Offered: A, W, Sp, S.

RES D 525P, 526P, 527P Fixed Prosthodontics (3, 3, 3) Serve as introduction to area of restorative dentistry dealing with indirect restorations. Preclinical experience provided in tooth preparation and restoration, fabrication for various crown designs, singly and in conjunction with various pontic types to serve as fixed partial denture prostheses. Projects emphasize single-tooth preparation/restoration, multiple-tooth preparation/restoration, and esthetic veneer restorations. Offered: A, W, Sp.

RES D 530P, 531P, 532P Restorative Dentistry (2, 2, 2) Lecture series related to 630P presenting restorative dentistry principles, including supportive material on clinical procedures. Offered: A, W, Sp.

RES D 540P, 541P Advanced Restorative Dentistry (2, 2) Broadens base of restorative procedures. Introduction of new techniques and preparation for state board examination. Offered: A, W.

RES D 542P New Developments in Dental Materials (1) Dental materials recently introduced to dental profession reviewed, compared to current materials, and clinically demonstrated. Offered: Sp.

RES D 550P Directed Studies in Restorative Dentistry (*, max. 6) See DPHS 449 for course description and prerequisite. Offered: AWSpS.

RES D 570 Review of Literature Seminar (1, max. 6) Continuous weekly seminar devoted to a review of restorative and related literature, and discussion of teaching methods, philosophy of teaching and treatment. Offered: AWSpS.

RES D 580- Restorative Treatment Planning Seminar (1-, max. 8) Continuous weekly seminar to discuss controversial treatment problems and difficult diagnostic cases selected for graduate students. Offered: AWSpS.

RES D 581- Comprehensive Treatment Planning (2-, max. 4) Seminar devoted to the diagnosis and treatment of comprehensive dental cases with special emphasis given to the relationship of periodontics to restorative dentistry. Offered: Sp.

RES D 585 Dental Materials Science (2) Introductory course in dental materials science, including research design, testing methods, and selection of materials appropriate for clinical use. Offered: W.

RES D 588 Masticatory Functional Analysis and Occlusal Adjustment (2) Lecture/seminar and clinical sessions in the study of the physiology of occlusion. Pertinent literature reviewed and discussed from the multidisciplinary viewpoint. The clinical sessions include training in masticatory functional analysis and treatment of occlusally related diseases. Offered: A.

RES D 589 Review of Literature in Occlusion (2) Seminar to review pertinent literature in occlusion. Offered: S.

RES D 590- Fundamentals of Fixed Prosthodontics (2-, max. 4) Lecture/laboratory/clinical sessions in the study of gnathological principles and procedures as they pertain to the treatment of comprehensive cases assigned to the students. Use and application of several fully adjustable articulators. Offered: AW.

RES D 600 Independent Study or Research (*) Prerequisite: permission of graduate program adviser. Offered: AWSpS.

RES D 620P Introduction to Clinical Restorative Dentistry (1) Orientation to clinical operations, administrative procedures associated with restorative clinical, initial treatment plan, and limited treatment of patients. Offered: S.

RES D 630P- Clinical Restorative Dentistry (1-3-, max. 9) Clinical training in fundamental restorative dentistry procedures, including diagnostic, treatment planning, and therapeutic aspects of operative dentistry, fixed prosthodontics, and occlusal treatment. Offered: AWSpS.

RES D 640P- Advanced Clinical Restorative Dentistry (1-3-, max. 12) Clinical training in restorative dentistry procedures, including diagnostic, treatment planning, and therapeutic aspects of operative dentistry, fixed prosthodontics, and occlusal treatment. Offered: AWSpS.

RES D 650 Restorative Dentistry Clinical Elective (1-6, max. 12) Elective offering in clinical areas related to discipline. Offered: Sp.

RES D 659P Restorative Dentistry Extended Learning (*, max. 4) Supplemental work in restorative dentistry to correct an area of student deficiency. Credit/no credit only. Offered: S.

RES D 660- Oral Rehabilitation (2-6-, max. 32) Clinical course to provide experience in diagnosis and treatment of patients requiring restorative procedures from single restorations to complex oral rehabilitative methods. Special emphasis is directed toward the integration of periodontics and occlusion as they relate to restorative dentistry. Offered: AWSpS.

RES D 665 Clinical Practice Teaching (1, max. 4) Supervised experience in teaching clinical fixed prosthodontics to undergraduate dental students. Offered: AWSpS.

College of Education

Dean

Allen D. Glenn
222 Miller

Associate Deans

Sheila Lowenbraun
Richard S. Neel

The mission of the College of Education is reflected in the following goals: (1) to conduct systematic study and research on problems, concerns, and policies of education; (2) to conduct programs that will attract and prepare those who will provide leadership for the schools; (3) to experiment, innovate, and develop models for the improved preparation of school personnel; (4) to generate new ideas for the improvement of education; (5) to become intimately involved in cooperative and coordinated research and service activities with the educational enterprise; and (6) to develop systematic procedures for ensuring adequate attention to the education of minority groups.

Programs

In order to achieve its mission, the College of Education has two clusters of programs: (1) professional studies and (2) graduate studies. Each cluster is administered by an associate dean. The professional certification programs lead to a number of professional certificates in the field of education. The various graduate degree programs lead to the Master of Education, Doctor of Education, or Doctor of Philosophy degrees. A new Master in Teaching (MIT) degree program is in the process of gaining state approval. The MIT will be awarded to elementary and secondary certification students at the completion of their program.

Special Offices and Services

The College of Education maintains a number of special offices to assist in the fulfillment of its goals. Among these are the Office of Teacher Education, the Office of Student Services, and the Office of Minority Recruitment and Retention. In addition, the College of Education maintains formal relationships with a number of school districts in the area to provide research and field experience opportunities for the students in the various programs. Individuals interested in teacher certification should contact the Office of Teacher Education, 211 Miller. Individuals interested in graduate degree programs should contact the Office of Student Services, 206 Miller.

Professional Certification Programs

Sheila Lowenbraun, Associate Dean for Teacher Education
Office of Teacher Education
211 Miller, Box 353600

The College of Education is authorized by the State Board of Education to offer professional certificate programs in education for administrators, educational staff associates, and teachers. Academic counselors are available to help with pre-program counseling, applications, long-range planning, continuing certificate needs, referrals to other campus resources, general program advising, and registration.

Administrator Certificates

Administrator Certificate preparation programs for superintendents, principals, and program administrators are offered in the College of Education. Information concerning admission and requirements for these programs is available from the Area of Educational Leadership and Policy Studies, M204 Miller.

Educational Staff Associate Certificates

Educational Staff Associate Certificate preparation programs are offered for the school speech language pathologist or audiologist (SLP), occupational therapist, school counselor, school psychologist, and school social worker. These programs are offered in various departments of the University or in the College of Education. Information concerning requirements and admission may be obtained as follows: school speech language pathologist or audiologist (SLP)—Department of Speech and Hearing Sciences, 203 Eagleson, Box 354875, University of Washington, Seattle, Washington 98195-4875; occupational therapist—Department of Rehabilitation Medicine, CC-902 University of Washington Medical Center, Box 356490, Seattle, Washington 98195-6490; school counselor and school psychologist—College of Education Office of Student Services, 206 Miller, or Area of Educational Psychology, 312 Miller, Box 353600, University of Washington, Seattle, Washington 98195-3600; school social worker—School of Social Work, Box 354900, University of Washington, Seattle, Washington 98195-4900.

Teaching Certificates

The College of Education is authorized by the State Board of Education to prepare and recommend individuals for Initial and Continuing Teaching Certificates. The Teacher Education Program is accredited by the National Council for the Accreditation of Teacher Education and by the National Association of State Directors of Teacher Education and Certification. Graduates are qualified for certification in all states party to the Interstate Certification Compact and in other states as well.

Initial Teaching Certification Program

The College of Education offers initial teaching certification for individuals desiring careers as elementary, middle/secondary school teachers or as special education teachers working with students with severe disabilities or infants, toddlers, and preschool children with disabilities. Candidates may also select a teacher education/special education track which provides initial certification in elementary education with an endorsement in special education. All programs are offered at the Master's level. For additional information contact the Office of Student Services, 206 Miller.

An undergraduate program leading to certification in music education, grades K-12, is offered through the School of Music. For additional information contact the School of Music Advising Office.

Continuing Teaching Certificates

Teachers may obtain an initial renewal or a continuing certificate either through a state-approved teaching institution or through the Office of the Superintendent of Public Instruction. For information on the OSPI guidelines, contact any Educational Service District or the Office of Professional Licensing and Certification, OSPI, Box 47200, Old Capitol Building, Olympia, Washington 98504.

Teachers who wish to be recommended for the Continuing Teaching Certificate through the University of Washington, whether as postbaccalaureate or graduate students, should consult an adviser in the Office of Teacher Education regarding certificate requirements.

Endorsements on Teaching Certificates

Teachers holding an initial or continuing teaching certificate under the 1988 guidelines may add endorsements to their certificates which will qualify them to teach subjects and at grade levels in addition to those in which they were originally endorsed. For information on state requirements and on endorsement course work through the University of Washington, contact the Office of Teacher Education, 211 Miller, or UW Extension, Box 354221, Seattle, Washington 98105-4190. Teachers may also obtain applications and information and apply for endorsements directly through OSPI or an Educational Service District.

Graduate Degree Programs

Richard S. Neel, Associate Dean for Graduate Studies and Research,
Graduate Program Coordinator
Office of Student Services
206 Miller, Box 353600

The College of Education currently offers three advanced degrees: Master of Education, Doctor of Education, and Doctor of Philosophy. A new Master in Teaching (MIT) degree program is in the process of gaining state approval. The MIT will be awarded to elementary and secondary certification students at the completion of their program. Graduate students may specialize their degree studies in curriculum and instruction; educational psychology; educational leadership and policy studies; or special education. Questions regarding graduate study in education should be directed to the Office of Student Services, 206 Miller, Box 353600, College of Education, University of Washington, Seattle, Washington 98195-3600.

Master of Education

The Master of Education (M.Ed.) degree requires a minimum of 45 credits, including at least 15 credits in a specialized area of study in education; 9 credits related to but outside of the specialization, some course work outside education; 9 thesis credits or, for the nonthesis option, 9 credits in a field study or other approved project; and a final examination.

Doctor of Education

The Doctor of Education (Ed.D.) degree is designed to prepare professionals whose primary interest is to deal directly with problems of educational practice. The program of study leading to the Ed.D. degree, as a professional degree, focuses on the utilization of research knowledge and practitioners' knowledge, rather than on the production of research knowledge. Those who aspire to positions as master teachers, curriculum designers, or learning resource specialists, for example, would appropriately seek the Doctor of Education degree.

This professional degree requires at least two years of resident study, a program of specialized study with credit in education and related fields, sufficient preparation in research methodology to interpret research findings for use in practice, an internship and leadership training, a General Examination, a dissertation on a problem of educational practice, and a Final Examination.

Doctor of Philosophy

The Doctor of Philosophy (Ph.D.) degree in education is specifically a research degree. While the typical recipient of the Ed.D. degree becomes an educational practitioner in the schools or other educative agencies, the holder of the Ph.D. degree is prepared for a career of research on issues fundamental to the conduct of education—issues that range from fairly narrow questions about human learning to macroquestions regarding the form of societies' educational institutions. The scope of the Ph.D. degree in education is broad. It is

possible to pursue a degree organized around traditional study areas such as educational psychology, curriculum and instruction, special education, or educational leadership. A student may develop a course of study that integrates various elements of more than one study area (e.g., multiethnic education, literacy). One of the study options in the Ph.D. program is school psychology, which prepares students for the professional practice of psychology with school-age children, as well as for research.

Degree requirements include minimally two years of resident study, a program of specialized study with credits both in education and in other academic units, preparation in research methodology adequate to design and assess research in the field of specialization, sufficient study in cognate fields inside and outside of education to ensure that the candidate can place the specialized research in a broader context, a General Examination, a research dissertation, and a Final Examination.

Accreditation

The College of Education has the following formal accreditation: American Psychological Association (APA) for the Ph.D. program in school psychology; National Council for the Accreditation of Teacher Education (NCATE) for all certification programs in teaching and administration.

Admission Requirements

Applicants to the Master of Education degree programs must hold a baccalaureate degree from an accredited institution. Admission decisions are based on the applicant's grade-point average, Graduate Record Examination general test scores, goal statement, and other prerequisites stipulated by the area of specialization within the College. Application deadlines vary by program.

Consideration for admission to either doctoral program requires a master's degree or equivalent preparation in a field appropriate to the area of specialization, usually a 3.50 GPA in the master's program, a sample of scholarly writing, goal statement, and other prerequisites stipulated by the individual program of study. Graduate Record Examination general test scores are required; in addition, Doctor of Education degree applicants must submit a score from the Education subject test.

Although admission is competitive, admitted students have exhibited a wide range of performance on traditional criteria such as GPA and GRE scores. The College values diversity and encourages all applicants to apply. For more information contact the Office of Student Services, 206 Miller, Box 353600.

Financial Aid

The College of Education offers a limited number of awards with varying stipends for graduate students in education. Primary consideration is given to doctoral students with a background of successful teaching and/or administrative experience.

Specific information on the various types of remunerative appointments for graduate students in education, amounts of stipends, and application procedures may be obtained from the College of Education, Office of Student Services, 206 Miller, Box 353600, Seattle, Washington 98195-3600. The application deadline is February 15 annually.

Special Research and Service Facilities

Eight facilities within the College of Education provide opportunities for students to gain research and service experience: (1) The Center for Multicultural Education focuses on research projects and activities designed to improve practice related to equity issues, intergroup relations, and the achievement of students of color. (2) The Center for Educational Renewal responds to a growing nationwide interest in the renewal of schools

and teacher education by creating partnerships, promoting innovative programs and policies for the education of educators, and reforming leadership and governance structures. (3) The Center for Students At-Risk was established to foster interprofessional projects to encourage students to stay in school. (4) The Center for Effective Schools is committed to engaging in research and service activities designed to promote instructionally effective schools through collaboration and self-evaluation. (5) The School Law Division is interested in the improvement of professional practices of school administrators, including superintendents, principals, and program directors. (6) The Clinical Training Laboratory, operating under the aegis of Educational Psychology, offers observation rooms equipped with videorecorders where subjects can be observed and taped through one-way mirrors. (7) The world-renowned Experimental Education Unit offers an interdisciplinary approach to research, training, and service provision for children with disabilities and their families, that includes integrated programs with typically developing children. (8) The Institute for the Study of Educational Policy, which promotes interdisciplinary research that bears on education policy, provides a point of contact between the University and the educational policy researchers and analysts throughout the state.

Faculty

Professors

- Abbott, Robert D. * 1975; PhD, 1970, University of Washington; measurement, statistics and research design.
- Affleck, James Q. * 1967, (Emeritus); MA, 1963, San Francisco State; EdD, 1968, Columbia University; special education/inclusion.
- Anderson, Robert A. * 1965, (Emeritus); PhD, 1964, University of Minnesota; educational administration.
- Banks, James A. * 1969; MA, 1967, PhD, 1969, Michigan State University; social studies, multiethnic education.
- Berninger, Virginia Wise * 1986; PhD, 1981, Johns Hopkins University; educational psychology.
- Billingsley, Felix F. * 1977; PhD, 1974, University of Washington; special education (severely handicapped).
- Bolton, Dale Leroy * 1965, (Emeritus); PhD, 1958, University of Wisconsin; educational administration.
- Boroughs, Homer Jr. 1946, (Emeritus); MA, 1947, PhD, 1949, University of Washington; history and philosophy of education.
- Brammer, Lawrence M. * 1963, (Emeritus); PhD, 1950, Stanford University; counseling, adult development.
- Briggs, Robert 1947, (Emeritus); MA, 1950, EdD, 1954, University of Washington; business education.
- Brown, Frances A. 1953, (Emeritus); MA, 1950, Columbia University; business education.
- Burgess, Charles O. * 1964, (Emeritus); PhD, 1962, University of Wisconsin; history of education.
- Butterfield, Earl C. * 1981; PhD, 1963, George Peabody College; cognitive development, metacognition.
- Dohner, Charles W. * 1967; PhD, 1966, Ohio State University; program evaluation, administration, faculty development.
- Doi, James I. * 1979, (Emeritus); PhD, 1952, University of Chicago; finance and management of colleges and universities.
- Driscoll, John P. * 1967, (Emeritus); PhD, 1957, Pennsylvania State University; educational communications.
- Edgar, Eugene Bayard * 1972; PhD, 1972, George Peabody College; special education.
- Evans, Ellis D. * 1964, (Emeritus); EdD, 1964, Indiana University; human development and cognition.
- Fea, Henry R. 1954, (Emeritus); MEd, 1948, University of Saskatchewan (Canada); PhD, 1950, University of California (Berkeley); educational psychology.
- Foster, Clifford D. * 1959, (Emeritus); PhD, 1957, University of Washington; curriculum and instruction.
- Forster, Jerald R. * 1966; PhD, 1966, University of Minnesota; counseling.
- Freehill, Maurice F. * 1962, (Emeritus); EdD, 1948, Stanford University; school psychology/human development and cognition.
- Gay, Geneva * 1989; PhD, 1972, University of Texas (Austin); general curriculum theory, multicultural education, and educating African American students.
- Gehrke, Nathalie J. * 1979; PhD, 1976, Arizona State University; curriculum.
- Glenn, Allen D. * 1989; PhD, 1970, University of Michigan; teacher education, social studies education, and instructional computing.
- Goodlad, John I. * 1983, (Emeritus); PhD, 1949, University of Chicago; EdD, 1982, Eastern Michigan University; education reform, curriculum theory.
- Haring, Norris Grover * 1965, (Emeritus); EdD, 1956, Syracuse University; special education (early childhood).
- Hunkins, Francis Peter * 1966; PhD, 1966, Kent State University; curriculum.
- Irby, David M. * 1972, (Adjunct); PhD, 1977, University of Washington; the evaluation and improvement of clinical teaching in medicine.
- Jarolimiek, John * 1962, (Emeritus); PhD, 1955, University of Minnesota; social studies.
- Jenkins, Joseph R. * 1978; PhD, 1967, University of Minnesota; special education (mildly handicapped).
- Kaltsounis, Theodore * 1967; PhD, 1961, University of Illinois; social studies.
- Kerr, Donna H. * 1973; PhD, 1973, Columbia University; philosophy and education.
- Kerr, Stephen T. * 1985; PhD, 1975, University of Washington; information technology and telecommunications.
- Klockars, Alan J. * 1963; PhD, 1967, University of Washington; measurement, statistics and research design.
- Lovitt, Thomas C. * 1966; EdD, 1966, University of Kansas; special education (mildly handicapped).
- Lowenbraun, Sheila * 1968; PhD, 1969, Columbia University; special education (hearing impaired).
- Madsen, David L. * 1962, (Emeritus); PhD, 1961, University of Chicago; history of education.
- McCartin, Rosemarie E. * 1969, (Emeritus); PhD, 1964, University of Southern California; school psychology/human development and cognition.
- McCutchen, Deborah Elaine * 1986; PhD, 1985, University of Pittsburgh; cognitive processes underlying reading and writing skills.
- Meacham, Merle L. * 1964, (Emeritus); MS, 1956, University of Washington; school psychology.
- Mizokawa, Donald T. * 1973; PhD, 1974, Indiana University; human development and cognition.
- Morishima, James K. * 1960; PhD, 1967, University of Washington; human development and cognition.
- Morris, Arval * 1955, (Adjunct); JD, 1955, University of Colorado (Boulder); LLM, 1958, Yale University; LLD, 1972, Colorado College; constitutional law, jurisprudence, education law.

Neel, Richard S. * 1972; PhD, 1972, University of Southern California; special education (severely handicapped).

Odegaard, Charles E. 1979, (Emeritus); MA, 1933, PhD, 1937, Harvard University; history of medical education.

Olstad, Roger G. * 1964, (Emeritus); PhD, 1963, University of Minnesota; science education, teacher education.

Olswang, Steven G. * 1975; JD, 1971, University of Illinois; PhD, 1977, University of Washington; higher education administration and policy, law, faculty government, collective bargaining.

Parker, Walter C. * 1985; PhD, 1982, University of Washington; social studies.

Peckham, Percy D. * 1968, (Emeritus); PhD, 1968, University of Colorado (Denver); measurement, statistics and research design.

Reitan, Henry M. 1967, (Emeritus); PhD, 1950, University of North Dakota.

Robinson, Nancy M. * 1969, (Adjunct); PhD, 1958, Stanford University; psychology.

Ryckman, David B. * 1969; EdD, 1966, University of Illinois; special education (mildly handicapped).

Sax, Gilbert * 1965, (Emeritus); PhD, 1958, University of Southern California; measurement, statistics and research design.

Sebesta, Sam L. * 1963, (Emeritus); EdD, 1963, Stanford University; reading/language arts.

Sirotnik, Kenneth A. * 1985; PhD, 1969, University of California (Los Angeles); measurement, statistics, research design and evaluation, educational change and school renewal.

Standal, Timothy * 1976; PhD, 1976, University of Minnesota; reading/language arts.

Stowitschek, Joseph James * 1986, (Research); EdD, 1973, Utah State University; vocational and social development, service policies regarding disabled youth.

Strayer, George D. 1949, (Emeritus); MA, 1928, PhD, 1934, Columbia University; educational administration.

Thompson, Marie D. * 1979, (Emeritus); PhD, 1970, University of Washington; special education (hearing impaired).

Torkelson, Gerald M. * 1965, (Emeritus); EdD, 1953, Pennsylvania State University; learning resources.

Tostberg, Robert E. * 1962, (Emeritus); PhD, 1960, University of Wisconsin; philosophy of education.

White, Owen R. * 1973; PhD, 1971, University of Oregon; special education (severely handicapped).

Williams, Donald T. * 1969, (Emeritus); PhD, 1963, Stanford University; higher education.

Williams, Richard C. * 1990; PhD, 1966, University of Minnesota; career socialization of school principals; the process of school reform.

Winn, William David * 1985; PhD, 1972, Indiana University; educational technology, instructional theory, instructional design, visual information processing.

Associate Professors

Beal, Jack L. * 1973; MS, 1962, University of Kansas; PhD, 1972, University of Nebraska; secondary mathematics education.

Brown, Robert Lewis * 1965, (Emeritus); EdD, 1961, University of Arkansas; school psychology.

Dimmitt, Norma M. 1969, (Emeritus); MEd, 1963, University of Washington; EdD, 1970, Stanford University.

Frerichs, Alberta J. 1955, (Emeritus); MEd, 1951, University of Nebraska; business education.

Gray, Carol A. * 1971; PhD, 1971, University of Washington; educational psychology.

Grossman, Pamela * 1987; PhD, 1988, Stanford University; research on teaching and teacher education, teacher knowledge, and qualitative research methods.

Hansen-Krening, Nancy M. * 1974; PhD, 1974, University of Oregon; reading/language arts.

Kelly, Samuel E. 1970, (Emeritus); MA, 1960, Marshall University; PhD, 1971, University of Washington.

Knapp, Michael S. * 1990; PhD, 1981, Stanford University; public policy in education; policy research; sociology of education.

Kubota, Carole A. 1988, (Research); PhD, 1985, University of Washington; mathematics and science education.

Nelson, George D. * 1989, (Adjunct); PhD, 1978, University of Washington; stellar atmospheres, radiative transfer, hydrodynamics.

Nolen, Patricia A. * 1970, (Emeritus); PhD, 1970, University of Washington; school psychology/human development and cognition.

Nolen, Susan B. * 1990; PhD, 1986, Purdue University; development of students' achievement motivation and learning strategies.

Ostrander, Kenneth H. * 1968; EdD, 1968, University of Tennessee; educational administration.

Schwartz, Ilene Sharon * 1991; PhD, 1989, University of Kansas; early childhood, classroom-based interventions, and applied behavior analysis.

Smith, John P. * 1969; EdD, 1969, Stanford University; science education.

Sulzbacher, Stephen 1976, (Adjunct); MA, 1964, Hollins College, Virginia; PhD, 1971, University of Washington; psychiatry and behavioral sciences.

Thalberg, Stanton P. * 1965, (Emeritus); PhD, 1964, University of Iowa; school psychology.

Valencia, Sheila Denise W. * 1987; PhD, 1978, University of Colorado (Boulder); reading remediation, comprehension, instruction and assessment.

Vasquez, James A. * 1975; PhD, 1973, University of California (Los Angeles); learning (minority youth)/bilingual education.

Wineburg, Samuel S. * 1989; PhD, 1990, Stanford University; educational psychology, cognitive psychology of school subjects, historical cognition.

Zumeta, William M. * 1985, (Adjunct); PhD, 1978, University of California (Berkeley); public management, policy analysis, education and workforce policy.

Assistant Professors

Bamburg, Jerry D. * 1985, (Research); EdD, 1989, University of Washington; educational reform, organizational change.

Bashey, Husain Ismail 1968; MA, 1955, Bombay University (India); MA, 1960, Macmurray College; PhD, 1975, University of Oregon; counseling.

Beadle, Nancy Elizabeth * 1993; PhD, 1989, Syracuse University; history of education.

Janko, Kathleen S. * 1989; MS, 1984, PhD, 1991, University of Oregon; early childhood special education.

Janson, Jeanne E. 1995; MA, 1990, University of Iowa; literacy education.

Kerdeman, Deborah * 1990; MA, 1988, Stanford University; philosophy of education, philosophy of social inquiry, and hermeneutics.

Mazza, James J. * 1996; MS, 1990, PhD, 1993, University of Wisconsin; educational psychology/child and adolescent mental health.

Mukhopadhyay, Swapna 1991; PhD, 1989, Syracuse University; curriculum and instruction.

Nelson, Mary Lee * 1990; PhD, 1989, University of Oregon; counseling, interpersonal theory, process research, supervision, gender issues.

Plecki, Margaret L. * 1994; MS, 1976, University of Illinois; PhD, 1991, University of California (Berkeley); school finance, economics of education, policy analysis, school choice, study of education reform.

Portin, Bradley S. 1995; MEd, 1987, Seattle Pacific University; DPhil, 1995, Oxford University (UK); school administration/educational leadership.

Stage, Scott A. * 1995; MS, 1988, PhD, 1991, Florida State University; educational psychology.

Taylor, Catherine S. * 1991; MS, 1978, PhD, 1986, University of Kansas; educational psychology.

Taylor, Edward Jr. 1995; MA, 1983, Gonzaga University; PhD, 1994, University of Washington; history of higher education.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Education Curriculum and Instruction

EDC&I 324 Physical Education and Health in the Schools (2) Techniques and procedures for teaching physical education and health in elementary and secondary schools. Credit/no credit only. Prerequisite: admission to the Teacher Certification Program.

EDC&I 341 The Teaching of Art in the Secondary School (3) For majors in secondary art education planning to teach on the junior or senior high school level.

EDC&I 355 Language Arts in the Elementary School (3) *Hansen-Krening, Valencia* Basic course in planning and teaching elementary language arts: listening and speaking, written composition, handwriting, spelling, creative and practical writing.

EDC&I 356 The Teaching of English (3) Combines theoretical understanding of teaching with specific techniques and materials for literature, language, composition, and mass media at the secondary level; coordinated with concurrent experience in schools.

EDC&I 357 The Teaching of Speech (3) *Staton* Special methods course in the teaching of speech communication at the elementary and secondary levels. Prerequisites for majors in speech communication: at least 20 credits in speech communication; for nonmajors: permission of instructor.

EDC&I 360 Reading in the Elementary School (3) Basic course in methods, techniques, and materials used the teaching reading through decoding, comprehension, strategies, and literature in primary and intermediate grades.

EDC&I 365 Social Studies in the Elementary School (3) *Banks, Katsounis, Parker* Basic course in the planning and teaching of social studies in the elementary school.

EDC&I 366 The Teaching of Social Studies in Secondary Schools (3) *Katsounis, Parker* Application of educational principles and methods to the teaching of social studies on the junior and senior high school levels.

EDC&I 370 Science in the Elementary School (3) *Kubota, Smith* Basic course in the teaching of science in the elementary school with special emphasis on the nature of science as a process of inquiry. Prerequisites: 5 credits in an approved laboratory natural science course (biology, chemistry, or physics).

EDC&I 371 Teaching Science in the Secondary School (3) *Smith* Basic course in the teaching of science in the secondary school with special emphasis on the nature of science as a process of inquiry.

EDC&I 373 The Teaching of Chemistry (3) Prerequisites: 371 and at least 20 credits in college chemistry.

EDC&I 375 Mathematics in the Elementary School (3) *Beal, Mukhopadhyay* Examination of the learning and teaching of elementary mathematics, in light of recent theoretical and pedagogical developments. Prerequisite: MATH 170.

EDC&I 378 Teaching Mathematics in the Secondary School (3) *Beal, Mukhopadhyay* Basic course in the teaching of mathematics in the secondary school for preservice teachers. Prerequisite: permission of instructor.

EDC&I 424 Multicultural Curriculum and Instruction (3) *Gay* Primarily for preservice and in-service teachers who have little or no previous exposure to issues related to ethnicity and schooling. Designed to help teachers better understand the school's role in the ethnic education of students and acquire the insights, understandings, and skills needed to design and implement curricular and instructional strategies that reflect ethnic diversity. Prerequisite: admission to Teacher Education Program, teaching experience, or permission of instructor.

EDC&I 425 Instructional Strategies for Minority Students (3) Designed to equip educators with appropriate skills in effective teaching of culturally and socioeconomically different students. Attention is directed to understanding how these students differ from mainstream youth and what the implications are for instructional strategies in the classroom.

EDC&I 434 Introduction to Computers in the Classroom (3) Overview of the uses of computers in education. Uses of computers in instruction, classroom management (gradebooks, utilities), evaluation of software, overview of programming, and word processing. Prior experience not required.

EDC&I 436 Design and Authoring of CAI (3) *Winn* Introduction to the design of computer-assisted-instructional programs. Types of learning, characteristics of effective instruction. Students design and produce CAI programs using authoring systems for computers. Offered: jointly with T C 436.

EDC&I 437 Uses of Computer Application Packages in Schools (3) Introduction to the instructional and management uses of application programs. Topics may include: databases, spreadsheets, word processing, graphics packages, graphing utilities, telecommunication, desktop publishing. Emphasis is on K-12 setting. Prerequisites: 434 or equivalent and word processing skills.

EDC&I 443 Improvement of Teaching: Elementary School Music (3) Advanced studies in the teaching of music in the elementary school. Prerequisite: teaching experience.

EDC&I 453 Teaching the Bilingual-Bicultural Student (3) *Vasquez* Educational needs of bilingual students: research findings, special programs, materials, and methodologies that bilingual-bicultural education can provide to meet those needs. Cultural combinations of bilingual populations in American culture; historical, social, and linguistic factors affecting their K-12 education.

EDC&I 454 Cooperative Learning in the Classroom (3) Theory and research on cooperative learning and current practices of managing such learning. Team learning activities and opportunities to plan and try out lessons and materials using several different cooperative strategies. Credit/no credit only.

EDC&I 455 The Language Arts: Instructional Problems and Practices in the Elementary School

(3) *Hansen-Krening, Janson, Valencia* Study of important and recent research in elementary school language arts and consideration of its practical implications for teaching. Prerequisite: teaching experience.

EDC&I 456 Workshop in Instructional Improvement: Language Arts (1-6, max. 15) Individual or group study projects on the improvement of instruction in language arts.

EDC&I 457 Methods in Teaching English as a Second Language (3) *Vasquez* Prepares preservice and in-service teachers to teach English as a second language and to meet the educational and linguistic needs of students who have little or no English language skills. Emphasis on a survey of first- and second-language acquisition research and its educational implications, as well as instructional strategies consistent with the audiolingual, cognitive, and creative construction approaches to second-language learning. Includes diagnostic-prescriptive strategies for classroom application.

EDC&I 459 Workshop in Instructional Improvement: Reading (1-6, max. 15) Projects on the improvement of instruction in reading. Prerequisite: minimum of one course in methods of teaching reading.

EDC&I 460 The Teaching of Reading (3) *Janson, Valencia* Improvement of teaching reading in the elementary school, including comprehension and decoding, reading in the content fields, motivation of voluntary reading and teaching of literature. Prerequisite: teaching experience or prior course work in the teaching of reading.

EDC&I 461 Materials for Teaching Reading (3) *Hansen-Krening, Janson, Valencia* Designed to provide acquaintance with materials used in the teaching of reading. Trade books and materials from content areas are examined. Prerequisite: one prior course in the teaching of reading.

EDC&I 462 Reading in the Secondary School (3) *Standal* Teaching of reading in the secondary schools, including vocabulary development, comprehension, reading in the content fields, and organization of reading programs at the secondary level. Prerequisite: teaching experience or concurrent internship.

EDC&I 464 Educating Native American Youth (3) Assists students in understanding the North American Indian child from cultural, socioeconomic, and psychological points of view. Provides opportunities for the student to apply knowledge and skills gained in other courses to prepare programs and learning aids relevant to the educational situation of the Indian child.

EDC&I 465 Social Studies Education: Elementary School Programs and Practices (3) *Banks, Katsounis, Parker* Stresses curriculum patterns, instructional procedures, resource materials, and the selection of content in social studies. For elementary and middle school teachers. Prerequisite: teaching experience.

EDC&I 466 Social Studies Education: Secondary School Programs and Practices (3) *Parker* Stresses curriculum patterns, instructional procedures, resource materials, and a selection of content in social studies for middle, junior, and senior high school teachers. Prerequisite: teaching experience.

EDC&I 467 Geography in the Social Studies Curriculum (3) *I&S* Discussion of the concepts and content of geography essential to effective social studies curricula. Offered: jointly with GEOG 467.

EDC&I 468 Workshop in Instructional Improvement: Social Studies (1-6, max. 15) Individual or group study projects on the improvement of instruction in social studies.

EDC&I 469 Educating the Black Inner-City Child (3) *Gay* Intensive analysis and review of the research and literature, both theoretical and empirical,

relevant to curriculum patterns and programs designed especially for Black inner-city children. Special attention is given to the implications of the research reviewed for devising effective teaching strategies for Black inner-city children.

EDC&I 470 Science Education: Elementary School Programs and Practices (3) *Smith* Designed for classroom teachers with reference to the teaching and learning of science from kindergarten through grade 6. Emphasis is placed on objectives, methods, and materials as related to the concepts and processes of science. Prerequisite: teaching experience.

EDC&I 471 Science Education: Secondary School Programs and Practices (3) *Smith* Survey of the status and potential role of science in education; trends and their implications for the teaching of both biological and physical sciences in the junior and senior high schools; representative curricula and related teaching procedures; the psychology of concept formation and problem solving; and organization of science programs. Prerequisite: teaching experience.

EDC&I 472 Environmental Education for Teachers (3) *Smith* Status, selected problems, and role of environmental education in program of elementary, middle, and junior high schools. Opportunity to examine and receive instruction in use of existing environmental education instructional materials. Instruction is in the spirit of inquiry/discovery. Prerequisite: teaching experience.

EDC&I 473 Workshop in Instructional Improvement: Science (1-6, max. 15) *Smith* Individual or group study projects on the improvement of instruction in science.

EDC&I 474 Multi-Ethnic Studies: Methods, Content, and Materials (3) *Banks, Gay* Designed to help preservice and in-service teachers identify content and materials and devise methods for implementing ethnic studies programs and for incorporating ethnic content into regular K-12 social studies, language arts, and humanities curricula. Special attention is given to teaching about American Indians, Mexican-Americans, African Americans, Asian Americans, Puerto Rican-Americans, and White ethnic groups. Prerequisite: teaching experience.

EDC&I 475 Improvement of Teaching: Elementary School Mathematics (3) *Beal, Mukhopadhyay* Designed for elementary teachers. Emphasis is placed on the contributions of research to the improvement of the teaching of mathematics in the elementary school. Prerequisite: teaching experience.

EDC&I 476 Improvement of Teaching: Junior High School Mathematics (5) Exploration of mathematical concepts for the purpose of improving the teaching of middle school mathematics.

EDC&I 477 Improvement of Teaching: Secondary School Mathematics (5) Exploration of mathematical concepts for the purpose of improving the teaching of secondary-school mathematics. Prerequisite: teaching experience.

EDC&I 478 Special Topics in Mathematics for Teachers (2-9) NW Study of selected areas of mathematics. Designed for the improvement of teachers of mathematics. Offered: jointly with MATH 497.

EDC&I 479 Workshop in Instructional Improvement: Mathematics (1-6, max. 15) Individual or group study projects for the improvement of instruction in mathematics.

EDC&I 480 Introduction to Graduate Study in Educational Technology (3) *Winn* Introduction to the theoretical and practical aspects of educational technology. Introduces the history, conceptual orientation, and research of the field. The practical application of theory and research through the procedures of instructional design and development are also examined.

EDC&I 481 Introduction to Instructional Design (3) Students design a unit of instruction that relies upon a technology for its delivery. Steps in the design process discussed and practiced, and principles that guide selection of methods and materials applied.

EDC&I 482 Educational Technology in Schooling (3) Introduction to the application of technologies (computers, telecommunications, interactive video) in schools. Designed primarily for pre- and in-service teachers, but of interest to anyone involved in technology in education.

EDC&I 485 Workshop in Instructional Improvement: Educational Communication and Technology (2-6) *Kerr* Individual or group study projects on the improvement of instruction through use of educational communication and technology. Prerequisite: 480.

EDC&I 488 Educational Technology and Learning in Alternative Settings (3) How educational technology can be used to encourage learning in nonschool environments, such as museums, radio and television broadcasts, parks and recreation centers, and distance education programs. Students investigate one of these areas and prepare a project.

EDC&I 494 Workshop in Improvement of Curriculum (1-8, max. 15) Stresses the application of procedures for curriculum development, maintenance, and evaluation. Opportunities furnished to develop and perfect strategies for program development with occasions given to utilize the strategies in master plan and materials preparation for simulated or real school situations. Specific focus of workshop is determined by instructor or by arrangement with district. Prerequisite: permission of instructor.

EDC&I 495 Workshop in Improvement of Teaching: Selected Topics, Issues, or Problems (1-6, max. 15) Individual or group projects to help teachers adapt instruction to selected topics, issues, or problems and to identify the approaches and instructional resources that provide the soundest learning experiences.

EDC&I 496 Workshop in Instructional Improvement (2-6, max. 6) Individual or group study projects on the improvement of instruction with attention to designing instructional plans.

EDC&I 497 Dealing Effectively with the Disruptive Student (3) Several approaches to discipline. Using research, theory, and practice, participants develop individual action plans for classroom management, create formats to identify disruptive behavior, develop strategies for intervention of disruptive behavior, and devise means for evaluating the effectiveness of teacher interventions. Credit/no credit only.

EDC&I 499 Undergraduate Research (2-5, max. 5) Students developing studies under this rubric should be advised that a report or a paper setting forth the results of their investigations should be regarded as a basic part of the program.

EDC&I 500 Field Study (3/6, max. 9) Individual study of an educational problem in the field under the direction of a faculty member. Prerequisites: approved plan of study and permission of the instructor must be filed in the Office of Curriculum and Instruction in the College of Education.

EDC&I 505 Seminar in Curriculum and Instruction (1-3, max. 15) Seminar on advanced topics in curriculum and instruction. Critical examination of current research and practice. Content varies, check quarterly Time Schedule for topics to be covered. Prerequisite: permission of instructor.

EDC&I 524 Seminar in Teacher Education (3, max. 6) *Gehrke* Focus on recent research, issues, and proposals for future development in teacher education, certification, and continuing professional growth. Alternate year offering focuses on either preservice or inservice issues. Prerequisite: permission of instructor.

EDC&I 530 Seminar in Analysis of Approaches for Teaching Reading (3) *Janson, Valencia* Designed to aid experienced teachers who possess background in the teaching of reading, this course presents a variety of approaches and actual analysis of approaches. Prerequisites: teaching experience and a basic course in the teaching of reading.

EDC&I 531 Seminar: Analysis of Reading Materials (3) *Janson, Valencia* Students formulate and apply criteria for assessing materials, with emphasis on linguistic, cultural, and psychological factors; instruction effectiveness, interest level; and educational objectives. Prerequisites: teaching experience and one basic course in the teaching of reading.

EDC&I 532 Seminar in Research in Reading (3) *Standal, Valencia* Primary focus on those aspects of the reading process that are of concern in a developmental reading program. Emphasis is on research design, evaluation of research, and research findings dealing with factors influencing reading ability, problems in skill development, and recreational reading. Course work includes group and individual analysis of studies with attention to research design and measurement. Prerequisite: permission of instructor.

EDC&I 533 Seminar: Conducting Research in Reading (3, max. 6) *Standal* Students design and conduct original research studies in the field of reading. Emphasis on research rationale, choice of productive research types, and reporting of research results and implications. Prerequisite: 532.

EDC&I 534 Seminar in the Reading of Literature (3) *Hansen-Krening* Reading of literature and its effect on reading skills, language development, social values, and literary judgment of children and adolescents. Emphasis on analysis of research in these areas and on the development of action research designed to study response to literature. Prerequisite: one 400- or 500-level education curriculum and instruction course in reading or language arts or one graduate course in literature for children or young adults.

EDC&I 535 Seminar: Conducting Research in Response to Literature (3, max. 6) *Hansen-Krening* Students design, conduct, and interpret original research studies in the field of reading literature within the context of the school curriculum. Emphasis on the analysis of literary content and structure and the relationship of those qualities to the literary experience. Prerequisite: 534.

EDC&I 541 Seminar in Bilingual Education: Organization and Structure (4) *Vasquez* Study of the structure and organization of bilingual programs. Includes study of the developmental and organizational factors affecting bilingual education. Assists graduate students in reviewing the historical antecedents in bilingual education and in developing a personal philosophy about bilingual education.

EDC&I 542 Seminar in Bilingual Education: Instructional Foundations and Issues (4) *Vasquez* Study of the theoretical foundations and instructional implications of psychology and linguistics as they apply to bilingual education. Assists graduate students in exploring learning styles of bilingual children and in becoming familiar with the crucial issues in bilingual education.

EDC&I 543 Seminar in Bilingual Education: Instructional Strategies (4) *Vasquez* Study of instructional factors affecting bilingual education. Particular emphasis is given to research related to the variables involved in teaching in a bilingual environment. Assists graduate students in exploring instructional methodologies and formats as they apply to bilingual education and in becoming familiar with the current issues in bilingual education.

EDC&I 550 Educational Technology Research (3) *Winn* Analysis, critique, and practical experience with research studies of all types (experimental,

ethnographic, evaluation) concerning questions of interest to educational technologists. Prerequisite: 480, a research methods course, or permission of instructor.

EDC&I 555 Educational Futures (3) *Hunkins* Concept of alternative futures stressing manageability of the future. Attention is given to current and future events that can or might impact education. Basic future studies methods are considered with opportunities to apply such methods within educational arena. Prerequisite: prior graduate course work or experience in education.

EDC&I 556 Elementary School Curriculum (3) *Gay, Gehrke, Hunkins* Study of elementary school curriculum, its design, rationale, and delivery. Current trends and issues affecting elementary school curriculum analyzed.

EDC&I 558 Secondary School Curriculum (3) *Gay, Gehrke, Grossman, Hunkins* Systematic analysis of current curriculum practices, with particular emphasis on the social and historical forces affecting secondary-school curriculum.

EDC&I 559 Principles and Procedures of Curriculum Development (3) *Gay, Gehrke, Grossman, Hunkins* Intensive study of basic principles and procedures utilized in development of curricula. Participants have opportunities to apply such procedures in class activities. Attention given to curriculum foundations.

EDC&I 561 Seminar in Language Arts (3) *Hansen-Krening, Janson* Study of language with special attention to research pertaining to the social context of language in the classroom. Course work includes group and individual analysis of language arts studies with attention to research design and measurement. Prerequisite: 455.

EDC&I 562 Seminar in Reading and Language Arts: Secondary Emphasis (3) *Standal* Study of recent research in listening, oral language, reading, and written language, emphasizing psychological and interrelated aspects. Prerequisite: permission of instructor.

EDC&I 563 Current Issues in Language Arts Education (1-3, max. 6) *Hansen-Krening, Janson* Discussion of problems and issues of current interest and importance in language arts education. Prerequisite: 561.

EDC&I 565 Seminar in Social Studies Education: Elementary Emphasis (3) *Kaltsounis* Intensive study of the social studies curriculum, with particular emphasis on current literature and research. Prerequisite: 465 or equivalent.

EDC&I 566 Seminar in Social Studies Education: Secondary Emphasis (3) *Kaltsounis* Intensive study of the social studies curriculum, with particular emphasis on current literature and research. Prerequisite: 466 or equivalent.

EDC&I 567 Current Issues in Social Studies Education (1-3, max. 6) *Parker* Discussion of problems and issues of current interest and importance in social studies education.

EDC&I 569 Educating Ethnic Minority Youths (4) *Banks* Intensive analysis and review of the research and curricular programs related to the social, psychological, and political factors that influence the school experiences of ethnic minority youths. Special attention given to instructional and curricular programs for African American, American Indian, Mexican-American, Puerto Rican-American, and Asian-American students. Prerequisite: graduate standing or permission of instructor.

EDC&I 570 Seminar in Science Education: Elementary Emphasis (3) *Smith* Investigation of curriculum and instruction in science at elementary-school levels, with particular emphasis on current literature and research. Prerequisite: 470 or equivalent.

EDC&I 571 Seminar in Science Education: Secondary Emphasis (3) *Smith* Investigation of curriculum and instruction in science at secondary-school levels, with particular emphasis on current literature and research. Prerequisite: 471 or equivalent.

EDC&I 572 Current Issues in Science Education (1, max. 6) *Smith* Discussion of topics and problems of current interest and importance in science education. Prerequisite: graduate standing.

EDC&I 573 School Reform and Multicultural Education (3) *Gay* Similarities and differences among the visions, goals, and strategies of proposals for school reform and multicultural education are analyzed; implications for practice in curriculum and instruction are deduced from these analyses. Prerequisite: one course in multicultural education or permission of instructor.

EDC&I 574 Race, Gender, and Knowledge Construction: Curriculum Considerations (3) *Banks* Using historical and contemporary perspectives, considers ways in which knowledge related to race and gender has been and is constructed and the implications of ways in which knowledge is constructed for curriculum reform and teaching. Prerequisite: one course in ethnic studies, multicultural education, or women studies or permission of instructor.

EDC&I 575 Seminar in Mathematics Education: Elementary Emphasis (3) *Beal, Mukhopadhyay* Investigation of curriculum and instruction in mathematics at the elementary-school level; review of research and preparation of proposals. Prerequisite: graduate standing.

EDC&I 576 Seminar in Mathematics Education: Secondary Emphasis (3) *Beal, Mukhopadhyay* Investigation of curriculum and instruction in mathematics at the secondary-school level; review of research and preparation of proposals. Prerequisite: graduate standing.

EDC&I 577 Current Issues in Mathematics Education (1, max. 6) *Beal, Mukhopadhyay* Discussion of problems and issues of current interest and importance in mathematics education. Prerequisite: graduate standing.

EDC&I 578-579 Qualitative Methods of Educational Research (3-3) *Grossman, Knapp, Wineburg* Survey of various qualitative research methods from a variety of disciplinary perspectives (anthropology, cognitive psychology, policy analysis and evaluation) with intensive experience in collection, analysis, and reporting of data. Prerequisites: second year doctoral standing and one course in statistics. Students must enroll for both quarters. Offered: jointly with EDPsy 586-587.

EDC&I 580 Seminar in Educational Communication and Technology (3) *Kerr, Winn* History, basic assumptions, and current controversies of the field. Discussion of appropriate research, theory, and practice for educational technologists. Prerequisite: 480 or permission of instructor.

EDC&I 581 Management of Educational Technology Programs (3) Factors contributing to effective management of programs incorporating educational technology and microcomputers. Manager's role as agent of instructional change and processes leading to successful adoption and long-term implementation of a new instructional system. Prerequisite: 480 or permission of instructor.

EDC&I 582 Seminar on Instructional Systems Development (3) Critical analysis of processes involved in the development of instructional systems. Prerequisites: 481 or permission of instructor.

EDC&I 583 Message Design (3) *Kerr* Research and theory on design of instructional messages in various modalities (visual, auditory), and in various formats (pictorial, verbal, graphic). Prerequisite: 480 or permission of instructor.

EDC&I 584 Instructional Graphics for Microcomputers (3) *Winn* Study of current research on instructional uses of computer graphics. Development, selection, and application of design principles for graphically-based instructional and training programs. Prerequisites: 436, 481.

EDC&I 585 Technology and the Culture of Education (3) *Kerr, Winn* Social impact of technology on education in the United States and elsewhere: social, political, and cultural factors affecting educational communication and technology; roles and relationships among instructors and learners; appropriate technology in developing countries; technology's long-term influence on thought and values. Prerequisite: 480 or permission of instructor.

EDC&I 586 Current Issues for Computers in the Classroom (1, max. 6) Addresses many of the current topics in computer-related education. Issues and research related to computer uses in curriculum, instruction, and management of instruction.

EDC&I 587 Design of Interactive Instructional Systems (3) Theoretical and empirical questions involved in design of interactive instructional systems using such technologies as videodisc, and CAI. Specific problems inherent in design of complex learning environments: control, branching, structure and sequence of material, way-finding, help systems. Prerequisites: 481 or 582, and 436; or permission of instructor.

EDC&I 588 Seminar: Computers in Education (3) *Kerr, Winn* Provides opportunity for graduate students to analyze, discuss, and design research in areas of computers in education. Includes historical development of research in this area as well as a platform for the development of research proposals and refinement of ongoing research. Prerequisite: 434 or 436.

EDC&I 589 Current Issues in Educational Communications (1, max. 9) *Kerr, Winn* Discussion of problems and issues of current interest and importance in the field of educational communications. Serves also as a forum for discussion of doctoral research. Designed for master's and doctoral candidates in educational communications. Credit/no credit only. Prerequisite: graduate standing.

EDC&I 590 Seminar in Elementary Education (3) *Hunkins* Exploration of the philosophy, history, purposes, curriculum, methods, and school organization of elementary education. Prerequisites: elementary-school teaching experience, 556.

EDC&I 591 Seminar in Curriculum Research (3) *Gehrke, Hunkins* Analysis of past and current empirical, historical, ethnographic research, and philosophical analysis of the curriculum field. Studies considered include research in curriculum development, the curriculum plan, contextual characteristics, and factors related to curriculum participants. Group and individual analyses focus on theory generation and practical applications of research. Prerequisite: 559 or permission of instructor.

EDC&I 592 Seminar in Secondary Education (3) *Gehrke, Hunkins* Research and study of secondary education. Primary focus on factors involving change in secondary-school curriculum and organization. Prerequisite: 558.

EDC&I 593 Seminar in Curriculum: Theory and Practice (3) *Gay, Gehrke, Hunkins* Investigation of curriculum theory and practice. Consideration is given to theoretical writings that address the relationships between various curricular variables. Theoretical positions are related to curricular practices and innovations. Prerequisite: 559.

EDC&I 594 Seminar in Curriculum: Issues, Systems, Models (3) *Gay, Gehrke, Hunkins* Emphasis on the current approaches to curriculum and curriculum innovation. Attention is given to major educational issues as they affect curricular activity. Prerequisite: 559.

EDC&I 595 Seminar in Analysis of Teaching (3) *Gay, Gehrke, Grossman, Hunkins* Investigation of the ways in which classroom teaching has been analyzed from a variety of disciplinary perspectives. Focus on methods, findings, and implications of research on teaching. Prerequisite: teaching experience.

EDC&I 596 Seminar in Strategies of Instruction (3) *Gay, Gehrke, Grossman, Hunkins* Various instructional models applicable to all levels of schooling. Theoretical and philosophical bases for these instructional models are considered.

EDC&I 597 Curriculum Evaluation Seminar (3, max. 6) *Smith* Focuses on the evaluators' roles, evaluation theory and models, and selected curricular evaluations. Examples are drawn from the several disciplines commonly offered in the elementary and secondary schools. Students are expected to identify an evaluation problem and to develop an evaluation design that can be implemented as a practical solution to the problem. Prerequisites: 559 and permission of instructor.

EDC&I 599 Independent Studies in Education (*) Independent studies or readings of specialized aspects of education. Prerequisite: permission of instructor.

EDC&I 600 Independent Study or Research (*) Prerequisite: permission of instructor.

EDC&I 601 Internship (3-9, max. 9) Credit/no credit only. Prerequisites: graduate standing and permission based on approval of proposal submitted during quarter preceding the internship.

Educational Leadership and Policy Studies

EDLPS 444 Constitution and American Public Education (3-6, max. 6) *I&S* Emphasis on the principles, processes, and content of constitutional law in an effort to provide new insights and new tools with which school administrators and teachers may examine questions involving political and civil rights in the United States, especially as these affect the conduct of education. Specific topics on constitutional freedom include the obligation to go to school; legal controls over curriculum, teachers, and students; and racial integration and equal financing of public schools. Open to law students and to nonlaw students enrolled as graduate students or as upper-division undergraduates. Credit/no credit only. Offered: jointly with LAW 444.

EDLPS 458 History of American Education to 1885 (3) *I&S* Development of American education in cultural context; colonial period, influence of Enlightenment, and common school movement. Offered: jointly with HSTAA 458.

EDLPS 459 History of American Education Since 1885 (3) *I&S* Development of American education in cultural context: progressive education, recent criticism, continuing issues and trends. Offered: jointly with HSTAA 459.

EDLPS 479 Crucial Issues in Education (3) Selected educational issues, policies, and contexts. Evolution of the American education enterprise, legal issues, professionalism, finance, and other vital educational concerns. Prerequisite: admission to the Teacher Certification Program or permission of instructor.

EDLPS 496 Workshop: Education Programs and Problems (1-6, max. 12) Study of such topics as planning, development, supervision, organization, operation, or evaluation of current or emerging programs or problems in education.

EDLPS 499 Undergraduate Research (*) Students developing studies under this rubric should be advised that a report or a paper setting forth the results

of their investigations should be regarded as a basic part of the program. Prerequisite: permission of instructor.

EDLPS 501 Introduction: Leadership Beyond the Classroom (3-6, max. 6) First course in principal certification program; explores Washington State laws, legal principles, context of public schools, multicultural issues, changing population. Essential skills of leadership: communication, human relations, strategies for shared decision making, and dealing with conflict. (Open only to students admitted to the EDLPS Principal/Program Administrator Preparation Program.)

EDLPS 502-503-504 Leadership Core (3-6) [3-6]-[3-6] Topics include moral dimensions of leadership; modes of inquiry; organizational theory and change; history of educational reform; curriculum deliberation and instructional leadership and supervision; school-centered inquiry and decision-making; policy, planning, and program evaluation; issues on diversity and multicultural education; American and Washington State school law; school finance and resource allocation; school-community relations. Instruction occurs in units and seminar throughout the academic year. Prerequisite: admission to Principal/Program Administrator Preparation Program.

EDLPS 505 Transition to Leadership (3-6, max. 6) Development and administration of systems for selection, evaluation and clinical supervision of certificated and classified personnel. Focuses on leadership models and transition to a leadership role, including opening a school or program and dealing with student/school crises. (Only for students admitted to the EDLPS Principal/Program Administrator Program.)

EDLPS 507 Reflective Seminar (1-6, max. 6) Integration of theory and internship experience; group process laboratory and peer feedback and review of written work, oral presentations, and journals. Reading and discussion of crucial issues. (Only for students admitted to the EDLPS Principal/Program Administrator Preparation Program.) Credit/no credit only.

EDLPS 509 Planning, Organizing, and Decision Making (3) Application of principles utilized in planning, organizing, and decision making in districts and schools. Formation of policy and procedures; formal and informal organization; power, authority, and responsibility; utilization of people, time, and space.

EDLPS 510 School Finance (3) Financial practices and problems in districts and schools considered, including state and federal support plans, school plant planning, school business management, resource allocation, and budgeting and educational accountability.

EDLPS 511 School-Community Relations (3) Examines the dynamics of the interface between the public schools and the community. Special attention is given to the findings of research in relation to school-community power, types, and organizational influences.

EDLPS 512 Seminar in Personnel Administration and Development (3) Major emphasis on the analysis of factors to be considered in the selection and evaluation of teachers and administrators and considerations in staff development.

EDLPS 513 Seminar in Instructional Development and Supervision (3) Theory of the process of supervising instructionally effective school personnel, including an analysis of the techniques of supervision, theory of leadership and group process, interpersonal relations, and evaluation of teacher effectiveness.

EDLPS 514 Washington School Law (3) Overview of Washington State specific legal provisions affecting the operations and management of public schools, including school organization and operations, school finance, separation of church and state, school employment, student conduct, discipline and rights,

equity, intergovernmental agreements, and student health and safety. Prerequisite: 562 or equivalent.

EDLPS 515 Management of Labor Relations in Education (3) Examination of procedures and techniques pertinent to the management of organizational conflict. Among the areas covered are collective bargaining, grievance procedures, mediation, fact finding, and arbitration.

EDLPS 516 Special Education and the Law (3) Overview of major state and federal laws affecting the operation and management of special education programs in public schools. Emphasis upon procedural and substantive rights of children with disabling conditions. Offered: jointly with EDSPE 504.

EDLPS 517 Seminar in Administration: Facilities (3) Contemporary issues, problems, and techniques of educational facility administration. Emphasis placed on such factors as planning, financing, development, design, construction, operation, liabilities, property management, state regulation. Credit/no credit only.

EDLPS 518 Reflective seminar: The Superintendency (1-6, max. 6) Integration of theory and internship experience. Readings and discussion of crucial issues, presentations by local school superintendents: district budgeting processes, personnel, staff relations and collective bargaining, superintendent-board relations, bond issues, facilities planning, superintendent as instructional leader. Credit/no credit only.

EDLPS 519 Special Topics in Educational Leadership (1-3, max. 9) Readings, lectures and discussions pertaining to significant topics of special and current interest to educators. Focus is on issues of particular concern to K-12 administrators and other educators in leadership roles in districts and schools. Topics vary; check Time Schedule for topic(s) to be covered.

EDLPS 520 Education as a Moral Endeavor (3) An exploration of fundamental questions that have faced educational leaders in the past and most likely will continue to face them in the future. Foundational studies in history, philosophy, and sociology provide the basis for discussion and writing about these fundamental questions. Credit/no credit only.

EDLPS 521 Philosophy of Education (3) Philosophy of education considered as a study of the conceptual basis for educational policy and practice. Emphasis on relationships between enduring educational problems and fundamental philosophic issues; concepts that feature centrally in educational discourse; and conceptual analysis as a means for clarifying decisions regarding educational policy and practice.

EDLPS 522 Contemporary Philosophies of Education (3) Intensive study of the writings of selected contemporary philosophers of education.

EDLPS 523 Analysis of Educational Concepts (3) Selected concepts central to conduct and understanding of education.

EDLPS 524 Seminar in Philosophy of Education (3, max. 6) Philosophical examination of ways in which education might be studied. Uses and limits of conventional scientific approaches in education inquiry. Consideration of alternatives.

EDLPS 525, 526 Educational Inquiry (3,3) General survey of epistemological issues underlying the several schools of thought or families of inquiry. Overview of various methods used in conduct of educational inquiry, examples of ways those methods are typically used, and exploration of strengths and weaknesses of those methods. Discussion throughout is in terms of assumptions regarding the nature of knowledge and purposes of inquiry. Must be taken in sequence. Credit/no credit only. Prerequisite: doctoral status in education.

EDLPS 530 History of Education (3) Historical survey of education. Emphasis on relationship between idea and practice. Topics include education and colonialism, formation of state school systems, progressive education, equal educational opportunity, changes in textbooks and curricula, education and social structure, and education in the history of cultures.

EDLPS 531 History of American Higher Education (3) Examination of the historical development of the American higher education enterprise, including pre-colonial origins. Includes attention to the colonial colleges, the rise of new institutions in the nineteenth century, and the further development of American colleges and universities in the twentieth century. Leaders in these developments are identified.

EDLPS 532 Seminar: American Education in the Twentieth Century (3, max. 6) Selected problems in American education over the last century, with special emphasis on contemporary issues and trends.

EDLPS 533 Seminar in Educational Classics (3) Analysis in depth and in the context of the relevant history of several major works in educational thought from Plato to Dewey.

EDLPS 534 History of the Modern University (3) Growth of the modern university with attention to intellectual trends as well as organizational and curricular changes. Special attention is given to nine American universities in the twentieth century.

EDLPS 535 Historical Inquiry in Education Research (3, max. 6) Methods and critique of historical research in education. Examination of landmark works in education history and historiography. Hands-on experience framing historical questions, finding historical sources, using historical evidence, substantiating historical claims, and addressing issues in the history of education.

EDLPS 540 Sociology of Education (3) Examination of education and educational institutions by using the major conceptual tools of sociology. Emphasis on sociological thought and findings that have particular bearing on the understandings and judgments of educators.

EDLPS 541 Comparative Education (3) International efforts in education, including the role of the United States in overseas programs. Analysis of the relation of education and society in foreign areas, stressing social change and conflict. Regions of the world considered in the course vary from one offering to another.

EDLPS 542 Seminar in Educational Sociology (3) Application of sociological principles to school problems; individual problems and investigations. For teachers, administrators, and those using educational sociology as a field for advanced degrees.

EDLPS 543 Seminar: Research in Educational Sociology (3) Theory, concept, and method of sociological inquiry as applied to problems in education.

EDLPS 546 Special Topics in Educational Studies (1-3, max. 9) Readings, lectures, and discussions pertaining to significant and enduring ideas in the philosophy, history and sociology of education. Specific topics are critically examined in light of contemporary problems in education. Topics vary; check Time Schedule for topic(s) to be covered.

EDLPS 550 The Dynamics of Educational Organizations (3) Exploration of the literature in organizational theory and leadership, the assumptions that underlie the development of various approaches to organizational theory and how these approaches are applied, and an acquaintance with different conceptual frames that can be used to determine how to improve and change organizations. Credit/no credit only.

EDLPS 551 Foundational Studies in Complex Organizations (3) Examination of conceptual and theoretical bases for complex organizations, characterized by problematic goals, knotty decision-making processes, and fluid participation. Impact of information, power, beliefs, resources, organizational structure, and environment. Although issues discussed are generic, examples focus on educational organizations.

EDLPS 552 Organizational Change in Education (3) Change and innovation in educational organizations. Theoretical approaches include sociopsychological, rational planning, political perspectives, and those associated with notion of organized anarchies. Specific topics related to change and innovation (e.g., roles of beliefs, symbols and norms, diffusion of innovations, and research issues).

EDLPS 553 Human Resources in Educational Organizations (3) Analysis of factors involved in human resource problems related to operation of educational organizations. Motivation, perception, communication, role analysis, and dynamics of groups are studied through use of cases and seminal literature.

EDLPS 560 Perspectives on Policy & Policy Making in Education (3) This course introduces a variety of theoretical perspectives that can be used to analyze policy content, processes and outcomes. Includes a consideration of the power and limits of policy and a discussion of the many ways people in different positions in organizations can influence policy. Credit/no credit only.

EDLPS 561 Education Policies in Political Context (3) Systematic consideration of the structure and function of educational policies and problems of research in political context.

EDLPS 562 American School Law (3) Examination of persistent legal issues, including an analysis of how these issues are manifest in public policy debates.

EDLPS 563 Education, The Workforce, and Public Policy (3, max. 6) Examination of policy issues involving education, training, the economy, and the development of the nation's human resources. Relationship between education, training, and work, underutilized workers, race and gender discrimination issues, and the role of education and training in economic development. Offered: jointly with PB AF 571.

EDLPS 564 Seminar in Economics of Education (3) Current problems in school finance, including costs, ability to support schools, and financial implications of educational principles. The economics of public education. Problems of federal, state, and local school support. Financing capital outlay, research, and public relations.

EDLPS 565 Power and Politics in Organizational Decisionmaking (3) Focuses on conceptual frameworks that can be used to analyze power-influence processes in complex organizations and research methods that are well-suited to the study of these processes. Opportunities to design studies of power relations and political processes are provided.

EDLPS 566 Education Policy Serving Disfranchised Groups (3) This seminar examines programs and policies aimed at ameliorating conditions that face disenfranchised groups in contemporary K-12 schooling. Seminar members critically analyze the assumptions, design, and likely impact of these programs and policies on institutions and individuals. Designed for advanced doctoral students. Others admitted with permission of instructor.

EDLPS 567 Education Policy and the Improvement of Teaching and Learning (3) Examines connections between policies and classroom practice, in P-12 and higher education settings. Of particular concern is the capacity of policy to improve the quality of curriculum and instruction. Students design and critique policies, research and feedback from policymakers.

EDLPS 568 Policy Evaluation and Organizational Decision-Making (3) Examination of methods for evaluating educational policies across the educational continuum. Students design and conduct a policy evaluation which draws on the policy evaluation literature. Examination of the uses of policy evaluation information in shaping organization-decision making is also included.

EDLPS 579 Special Topics in Organizational & Policy Analysis (1-3, max. 9) Readings, lectures and discussions pertaining to significant topics of special and current interest to educators. Focus is on issues related to the analysis of educational organizations, policies, and policy making. Topics vary; check Time Schedule for topic(s) to be covered.

EDLPS 580 The American College and University (3) Introduction to contemporary United States higher education, with special emphasis on emerging trends, roles of the several kinds of institutions, the composition and character of student bodies and faculty, and the state coordination of colleges and universities.

EDLPS 581 Principles and Practices of Adult and Continuing Education (3) History and development of adult and continuing education in the United States: component parts of the field; issues, theory, and research; program planning for adults; professionalization of the field.

EDLPS 582 Seminar in the History and the Organization of Higher Education (3) Advanced seminar in the history and the organization of higher education.

EDLPS 583 Higher Education and the Law (3) Legal implications of university operations and an explanation of the legal and constitutional rights of students, faculty, and staff within the university. Special attention given to faculty employment and termination decisions; student protections, including due process; and university liabilities.

EDLPS 584 Academic Governance and Collective Bargaining in Higher Education (3) Explores the concept and operation of collective bargaining in higher education: its origin; the reasons for its growing popularity as a governance mechanism; the legal framework within which it operates; the rights, powers, and duties subsumed under its operation; and its relationship to the traditional form of faculty governance mechanisms.

EDLPS 585 Resource Allocation in Higher Education (3) After attention to the basic tools of economic analysis, focus is on application of those tools to specific topics in higher education (e.g., access, budgeting, finance and policies, and funding alternatives).

EDLPS 586 Seminar in the Administration of Colleges and Universities (3) Study of the internal administration and organization of four-year colleges and universities with emphases on practice and theory. Instruction largely by the case or problem method.

EDLPS 587 Seminar in Teaching and Learning in Higher Education (3, max. 9) Theory and practice of instruction and learning in higher education.

EDLPS 588 Seminar in Administration of Community Colleges (3) For students preparing for administrative positions in community colleges. Principles and practices in organization and administration of community colleges.

EDLPS 589 The Community College (3) Intensive study of the community college—its history and present and future status. Curriculum, instruction, financial, and governance issues are also discussed.

EDLPS 598 Special Topics in Higher Education (1-3, max. 9) Readings, lectures, and discussions pertaining to significant topics of special and current interest to educators. Focus is on issues related to education in community colleges, four-year colleges and

universities. Topics vary; check for topic(s) to be covered.

EDLPS 600 Independent Study or Research (*) Registration must be accompanied by a study prospectus endorsed by the appropriate faculty adviser for the work proposed, and which with permission of the instructor, must be filed with the Office of Leadership & Policy Studies in the College of Education. Prerequisite: permission of instructor. Credit/no credit only.

EDLPS 601 Internship (1-9, max. 9) Name of faculty member responsible for supervising the student should be indicated on program of studies. Credit/no credit only. Prerequisite: permission of Supervisory Committee chairperson or graduate program adviser.

Educational Psychology

EDPSY 304 Educational Psychology (5) Human learning in the educational setting. Cognition, development, learning, motivation, affective processes, and socialization. Emphasis on skills in influencing classroom learning and discipline. Prerequisites: admission to Teacher Certification Program and concurrent enrollment in EDUC 302. Offered: Sp.

EDPSY 425 Reading Disability: Remedial Techniques (3) Evaluation of methods for diagnosing and minimizing reading retardation. Descriptions of in-class and clinical procedures. Prerequisite: EDC&I 360 or equivalent. Offered: Sp.

EDPSY 449 Laboratory in Educational Psychology (2-6, max. 6) Special studies for counselors, teachers, administrators, and others concerned with student personnel and psychological services in schools and colleges. The course focuses on special topics that have either local or contemporary significance.

EDPSY 471 Neuropsychology of School Learning and Behavioral Problems (5) The microstructure, macrostructure, and structural and functional development of the brain are reviewed with a focus on the educational relevance of developmental neuropsychology. We read and critique articles in four areas: Hemispheric differences and integration; neurological soft signs, attention deficit, and hyperactivity; language, reading, and learning disabilities; and medical syndromes. Credit/no credit only. Offered: Sp.

EDPSY 490 Basic Educational Statistics (3) Measures of central tendency and variability, point and interval estimation, linear correlation, hypothesis testing. Offered: AWSp.

EDPSY 499 Undergraduate Research (*) Students developing studies under this rubric should be advised that a report or a paper setting forth the results of their investigations should be regarded as a basic part of the program. Offered: AWSp.

EDPSY 500 Field Study (*) Individual study of an educational problem in the field under the direction of a faculty member. Prerequisites: approved plan of study and permission of the instructor must be filed in the Office of Educational Psychology in the College of Education. Offered: AWSp.

EDPSY 501 Human Learning and Educational Practice (3) Systematic examination of current research about human learning and instructional psychology, including the study of motivation, human abilities, and learning, the learning process, and performance assessment. Offered: AWSp.

EDPSY 502 Developmental Foundations of Early Learning (3) Perceptual-motor, language, and overall cognitive development in children from birth through primary-school age. Emphasis on basic learning processes and guidelines for assessment of developmental status and their implications for parents and professionals. Field-based course projects may be required.

Prerequisites: background in child development and 501 or equivalent. Offered: A.

EDPSY 503 Theories of Intelligence (3) Reading and discussion of theoretical and research papers from the extensive literature on Piagetian, psychometric, and information processing conceptions of intelligence. An historical approach to the topic is followed by analysis of current writings on intelligence and its measurement. Credit/no credit only. Prerequisites: 501 and graduate status in education or psychology. Offered: alternate years; W.

EDPSY 506 Instructional Theory (3) Sources, current state, and utility of prescriptive instructional theories with emphasis upon theories having a potential for guiding the design of instruction. Prerequisite: 501 or equivalent. Offered: Sp.

EDPSY 507 Reading, Writing, and Arithmetic: Educational Assessment and Consultation (5) Students administer and interpret tests of reading, writing, arithmetic, and related developmental skills; integrate test, observational, interview, and portfolio information in staffings and written reports; and consult with teachers regarding educational interventions. Prerequisites: graduate standing in the school psychology specialization and permission of instructor. Offered: A.

EDPSY 508 Clinical Supervision-Practicum (2-6, max. 12) Practicum in supervising counseling, group counseling, diagnostic activities, and remedial academic therapy. Prerequisites: advanced graduate standing. Offered: AWSp.

EDPSY 509 Educational Issues in Human Development (5) Human development theories. Educational implications of theory, methodology, and application. Current research complements the historical antecedents of current practice. Age range covered varies as function of current issues in professional literature. Prerequisites: 15 credits in educational psychology or psychology. Offered: alternate years; W.

EDPSY 510 Educational Issues in Human Learning (3) Contemporary issues and trends in human learning from the perspective of major psychological theories of learning. Both classic and emerging viewpoints on issues about learning theory for educational practice, including counseling and special programs. Prerequisite: 501 or equivalent. Offered: alternate years.

EDPSY 511 Seminar in Applied Educational Psychology (1, max. 6) Designed for graduate students in educational psychology. Applications of theoretical constructs to particular problems encountered in school counseling, practice.

EDPSY 519 Communication and Language in Young Exceptional Children (3) Review and discussion of theories of language acquisition as they relate to communication and language in young children. Review of research of language environments that relate to early literacy and education and how to use this information to modify environments for special needs children. Offered: jointly with EDSPE 521; A.

EDPSY 520 Psychology of Reading (3) Reading and perception, word recognition, concept development and meaning in reading, psychology of reading interests and skills. Prerequisite: 501 or equivalent. Offered: alternate years; Sp.

EDPSY 521 Psychology of Writing (3) Examines writing as a cognitive process and reviews current empirical research on writing, emphasizing primarily studies from a psychological perspective. Explores both developmental differences and individual differences in writing skills, together with instructional implications. Prerequisite: 501 or equivalent. Offered: alternate years.

EDPSY 522 Reading Disability Clinic (3-5) Supervised practicum in diagnosis and remediation of reading disabilities. Prerequisites: 425, or equivalent; 507

and EDC&I 360 and 460; and permission of instructor.

EDPSY 524 Problem Solving and Critical Thinking in Education (3) Study of the classic and contemporary research literature concerned with human problem solving and critical thinking with emphasis upon applications to educational practice and further research. Prerequisite: 501 or equivalent.

EDPSY 525 Creativity and Education (3) Study of the classic and contemporary research literature about creativity with emphasis upon applications to educational practice, evaluation of strategies to promote creativity in the schools, and further research. Prerequisite: 501 or equivalent.

EDPSY 526 Seminar on Metacognition (3) Students read and discuss theoretical and research papers from the extensive literature on metacognition. Focuses on defining the concept of metacognition, establishing its range of applicability to educational matters, and becoming familiar with excellent examples of metacognitive research. Prerequisites: graduate status in education or psychology and permission of instructor. Offered: alternate years; Sp.

EDPSY 527 Transfer of Teaching (3) Students read and discuss a representative sample of theoretical and research papers from extensive literature on teaching to promote transfer of what students learn to non-teaching environments. Historical approach to the topic is followed by analysis of current writings on transfer. Credit/no credit only. Prerequisites: 501 and graduate status in education or psychology. Offered: alternate years; Sp.

EDPSY 528 Achievement Motivation in Education (3) Critical review of current research and major theories of achievement motivation in schools and other educational settings. Emphasis on the relationship of theories to the contexts and practice of education. Prerequisite: EDPSY 501 or permission of instructor. Offered: W.

EDPSY 531 Socialization of School-Age Children (3) Study of personal social development and behavior from preschool age through preadolescence. Socialization theory and research are reviewed to include such topics as aggression, achievement, motivation, moral development, social cognition, and applicable socialization influences. Offered: Sp.

EDPSY 532 Adolescence and Youth (3) Includes middle school, senior high, and early college years, with implications for helping professions. Developmental processes and patterns examined with major theoretical and current research themes from behavioral sciences. Educational issues, social problems associated with adolescence in Western culture. Prerequisite: 501 or equivalent. Offered: A.

EDPSY 533 Current Research in Adolescence (3) Contemporary trends and patterns of adolescent research are examined with emphasis upon theoretical foundations, contrasting methodologies, and implications for further research. Exemplary studies and integrative reviews of research on adolescence are featured. Prerequisites: 532 and 591 or equivalents.

EDPSY 534 School Problems of Adolescence (3) Study of the classic, contemporary, and emerging school problems of secondary school age youth with emphasis upon problem solving strategies for educators and associated youth service personnel. Includes problems of academic achievement, interpersonal relations, and social deviancy in the schools. Prerequisite: 532 or equivalent.

EDPSY 535 Education and the Highly Capable Learner (3) Examination of major issues and problems in study and nurturance of highly capable children and youth in the educational setting. Emphasis placed on contributions of theory and research to educational problem solving for multiple aspects of advanced human capacity. Prerequisite: 501 or equivalent.

EDPSY 536 Learning Variables of Minority Children: Instructional Implications (3) Provides students with data base regarding (1) four variables (language/dialect, cognitive style, locus of control, and motivational systems) that affect learning among minority students, and (2) teaching strategies appropriate for these cultural socioeconomic variables. No credit given for students who have completed EDC&I 425. Offered: ASp.

EDPSY 540 School Psychological Assessment (5) Study of assessment of human intelligence with supervised training in the administration, scoring, and interpretation of individual intelligence tests with emphasis on Stanford-Binet and Wechsler scales. Prerequisite: graduate standing in the school psychology specialization and permission of instructor. Offered: A.

EDPSY 541 Group Tests in Counseling (5) Emphasis on the utilization of objective measures in counseling. Prerequisite: 490 or equivalent. Offered: Sp.

EDPSY 542 Career Development (3) Emphasis on vocational development theory and research. Psychological, social, and economic determinants of vocational development and choice are examined as a basis for vocational counseling. Prerequisite: graduate standing or permission of instructor.

EDPSY 543 Facilitating Career Development (3) Theory and practice in exploring, clarifying, and articulating individual goals and career plans. Offered: Sp.

EDPSY 544 Counseling (5) Emphasis on the theory and practice of counseling.

EDPSY 545 Prepracticum (3) Competency-based skills training for beginning counseling and school psychology students. Attending, listening, focusing, and intervening behaviors for use with adults and children. Introduction to theories of helping. Prerequisite: enrolled in school counseling or school psychology or permission of instructor. Offered: A.

EDPSY 546 Counseling Practicum (3) Supervised practice in counseling. Prerequisite: 545. Offered: WSp.

EDPSY 548 Educational Implications of Personality Theory (5) Study of personality development and personality theories with continuous attention to the meaning of these in educational practice, testing, and counseling. Prerequisites: 15 credits of psychology and educational psychology. Offered: A.

EDPSY 549 Seminar in Consultation Methods (3) Theory and practice of process consultation in educational settings. Field practice in teams with clients. Offered: W.

EDPSY 550 Family Counseling (3) Introduction to family counseling theory and practice, emphasizing family dynamics and communication analysis. Prerequisite: 544 or permission of instructor. Offered: W.

EDPSY 551 Group and Behavioral Intervention (3) Introduction to competency-based skills for beginning school psychology students. Includes basic processes of group management skills with children including group process in social skills training, problem-solving techniques, behavioral principles, and parent training. Prerequisites: 545 or course in counseling techniques or permission of instructor. Offered: Sp.

EDPSY 555 Seminar in Counseling Specialty (1-2, max. 6) Oriented toward the role of a counselor as a professional worker. Credit/no credit only. Offered: ASp.

EDPSY 561 Group Process Laboratory (3) Experience in small-group process. Collateral discussions of process and independent study. Offered: A.

EDPSY 562 Group Counseling in Schools (3) Provides students with the opportunity to co-facilitate

tate groups in elementary, middle, and secondary schools, supplemented by weekly didactic presentations of counseling and guidance models. Prerequisite: 561 or permission of instructor. Offered: W.

EDPSY 564 Practicum in School Psychology (1-8, max. 8) Practicum in appraisal and counseling, emphasizing diagnosis and counseling with behavior and learning disabilities, and focusing on techniques acquired in 540, 545, and 565. Offered: W.

EDPSY 566 Case Study Seminar (1, max. 4) Integrating theoretical concepts with practice/service issues. Cases selected for discussion represent a wide range of problems and agency settings, including school and child problems. Offered: AWSp.

EDPSY 568 Seminar in Professional Issues and Ethics (2) Professional ethics codes and cases, history of counseling or school psychology, legal problems, credentialing issues, conditions of practice, continuing education, publishing, and presenting research papers. Credit/no credit only. Offered: W.

EDPSY 569 Seminar in Counseling Psychology Research (2) Methodological and professional issues related to research in counseling and psychological services. Counseling psychology research literature with focus on content and methods. Prerequisite: 591 or equivalent. Offered: A.

EDPSY 570 Introduction to School Psychology (2, max. 4) Current issues in professional psychology practice and research. Limited to graduate students in school psychology. Offered: A.

EDPSY 571 Educational Applications of Neuropsychology: Assessment and Intervention (5) Students observe and administer neuropsychological tests and plan and carry out educational interventions for children with neuropsychological disorders. Content focuses on various neuropsychological disorders for which school psychologists can provide assessment and consultation. Prerequisites: 540 or equivalent course in individual testing, and 471 or permission of the instructor.

EDPSY 572 Social-Emotional Assessment (3) Techniques in social-emotional assessment of school-aged children. Diagnostic systems including DSM IV and ICD-10 presented in conjunction with assessment techniques. Emphasis on integrative method for understanding child development and family systems. Prerequisites: school psychology or counseling student or permission of instructor. Offered: A.

EDPSY 573 Psychological Assessment of Pre-school Children (3) Students learn to give and interpret five tests of intellectual development to assess language, play, and social/emotional functioning, and to write psychological assessment reports for infants, toddlers, and preschoolers. Credit/no credit only. Prerequisites: graduate standing in the school psychology specialization and permission of instructor. Offered: Sp.

EDPSY 575 Structural Equation Modeling (3) Theory and data analysis using linear structural equation models. Application to data in educational research. Prerequisite: 594 or equivalent. Offered: alternate years.

EDPSY 576 Hierarchical Linear Models (3) Theory and data analysis for research models where random factors are nested, such as multi-level data, growth curve analysis, and meta-analysis. Prerequisite: 593 or equivalent. Offered: alternate years.

EDPSY 580 Seminar: The Emergence of Educational Psychology (3) Examination of documents by selected contributors to the field of educational psychology. Special focus on period from mid-nineteenth century to early twentieth century. Prerequisite: graduate standing. Offered: A.

EDPSY 581 Seminar in Educational Psychology (1-3, max. 15) Seminar on advanced topics in educational psychology.

A critical appraisal of current research. Prerequisite: advanced degree work in educational psychology. (Check quarterly Time Schedule for subject listings, which vary from quarter to quarter.) Offered: AWSp.

EDPSY 582 Seminar in Development and Socialization (3, max. 15) Advanced seminar on selected topics concerned with human development and socialization processes. Emphasis placed upon empirical research and its theoretical underpinnings in such areas as cognitive development, moral development and education, self-concept development, and related concerns.

EDPSY 583 Seminar in Learning and Thinking (3, max. 15) Seminar in the psychology of learning language and language learning. Each seminar is offered with predesignated emphasis in one of the following topics: linguistics, phonology, pragmatics, psycholinguistics, semantics.

EDPSY 584 Seminar in Quantitative Methods (3, max. 15) Seminar on such topics as measurement techniques, research design, psychometrics, and statistics.

EDPSY 586-587 Qualitative Methods of Educational Research (3-3) Survey of various qualitative research methods from a variety of disciplinary perspectives (anthropology, cognitive psychology, policy analysis, and evaluation) with intensive experience in collection, analysis, and reporting of data. Prerequisites: second year doctoral standing and one course in statistics. Offered: jointly with EDC&I 578-579; WSp.

EDPSY 588 Survey Research Methodology and Theory (3) Survey research, research, theory, and methodology. Probability theory, sampling, human subjects considerations, instrumentation, and analysis techniques. Review and critique by students of theoretical issues in survey research and development of a survey instrument. Prerequisite: 490 or equivalent. Offered: A.

EDPSY 589 Scholarly Writing in Education and Psychology (3) Introduction to the demands and expectations for technical writing in education and psychology, including aspects of the culture of scholarship. Designed for competent writers. Does not address basic grammar and composition. Prerequisites: doctoral standing, and permission of instructor. Credit/no credit only. Offered: W.

EDPSY 590 Computer Utilization in Educational Research (3) Computer utilization in solution of research problems, data reduction to forms amenable to computer solution, appropriate framing of problems for solutions by computer. Using an interactive system, editors, and program packages. Prerequisite: 490. Offered: A.

EDPSY 591 Methods of Educational Research (3) Introduction to educational research. Primary focus on hypothesis development, experimental design, use of controls, data analysis and interpretation. Prerequisite: 490. Offered: AWSp.

EDPSY 592 Advanced Educational Measurements (3) Theory of measurement; an examination of assumptions involved in test theory, errors of measurement, factors affecting reliability and validity, and item analysis. Prerequisite: 490. Offered: A.

EDPSY 593 Experimental Design and Analysis (5) Experimental design with emphasis on the analysis of variance. Prerequisites: 490 or equivalent. Offered: W.

EDPSY 594 Advanced Correlational Techniques (5) Multivariate analysis, including regression and multiple correlation; matrix algebra; factor analysis. Prerequisite: 490 or equivalent. Offered: Sp.

EDPSY 595 Measurement and Evaluation in Human Development and Education (3) Measurement strategies and evaluation research in developmental

psychology and education. Overview of major childhood intervention studies and procedures established and experimental measurement techniques, and problems of measurement and evaluation. Skill in evaluating measurement and evaluation design. Prerequisite: 490.

EDPSY 596 Program Evaluation (3) Advanced course in evaluation research emphasizing nontraditional designs, especially those that impose severe ecological constraints on the evaluators. Prerequisites: 593, 594, EDC&I 597, or permission of instructor.

EDPSY 597 Test Development (3) Principles of test construction, including criterion and norm-referenced tests, item writing and sampling, test administration, preparation, scoring, and item evaluation techniques; problems of scaling and norming of cognitive and affective measures. Prerequisites: 592 and 594, or permission of instructor.

EDPSY 599 Independent Studies in Education (*) Independent studies or readings of specialized aspects of education. Offered: AWSp.

EDPSY 600 Independent Study or Research (*) Prerequisite: permission of instructor. required. Offered: AWSp.

EDPSY 601 Internship (3-9, max. 9) Offered: AWSp.

Special Education

EDSPE 404 Exceptional Children (3) *Edgar, Madge* Atypical children studied from the point of view of the classroom teacher. Offered: AWS.

EDSPE 414 Introduction to Early Childhood Special Education (3) *Janko, Schwartz* Provides students with a comprehensive overview of major aspects of the field of early childhood special education. Theoretical foundations and program development and implementation are presented in an approach that integrates theory, research, and practice. Offered: AS.

EDSPE 419 Interventions for Families of Children with Disabilities (3) *Janko* Upper-division course for professionals and paraprofessionals working with families of children with disabilities enrolled in special education or integrated programs. Offered: SpS.

EDSPE 420 Classroom Management of the Physical Problems of Individuals With Severe or Profound Disabilities (3) *Kartin* Overview of physical management of pupils with severe or profound disabilities in educational settings. Principles of normal motor development, positioning, and handling are applied to the development of classroom strategies. Effects of abnormal motor development on educational programming. Offered: W.

EDSPE 496 Workshop in Special Education (1-9, max. 15) Demonstration, observation, and/or participation with groups of disabled children in laboratory or controlled classroom settings. Prerequisite: permission of instructor. Offered: AWSpS.

EDSPE 499 Undergraduate Research (2-5, max. 5) Students developing studies under this rubric should be advised that a report or a paper setting forth the results of their investigations should be regarded as a basic part of the program. Prerequisite: permission of instructor. Offered: AWSp.

EDSPE 500 Field Study (1-6, max. 6) Individual study of an educational problem in the field under the direction of a faculty member. Prerequisites: approved plan of study and permission of the instructor. Offered: AWSpS.

EDSPE 504 Special Education and the Law (3) *Julnes* Overview of major state and federal laws affecting the operation and management of special education programs in public schools. Emphasis on

procedural and substantive rights of children with disabling conditions. Offered: jointly with EDLPS 516; W.

EDSPE 505 Curriculum Development of Students with Moderate to Severe Disabilities (3) Addresses issues and practices in the development of appropriate curricula for students with moderate to severe or profound disabilities. Includes curriculum models, methods for the selection of appropriate skills for inclusion in Individualized Education Plans, and establishing priorities for instruction. Offered: W.

EDSPE 507 Instructional Methods for Students with Moderate to Severe Disabilities (3) *Billingsley* Details a systematic instructional process for the education of students with moderate to severe or profound disabilities. Includes instructional methods and materials designed to promote the development of functional skills and reduce challenging behaviors. Offered: A.

EDSPE 510 Behavioral Measurement and Management in the Classroom (3) *White* Response measurement in the classroom; use of data analysis for instructional decisions and behavior management; instructional programming for children with disabilities. Offered: A.

EDSPE 511 Methods of Applied Behavior Analysis Research (3) *Billingsley, White* Characteristics of applied behavior analysis are presented: direct, daily measurement, and the systematic investigation of important variables. Representative studies from various applied situations are discussed in terms of dependent and independent variables, research design, reliability, validity, and data analysis. Prerequisite: 510 or equivalent preparation. Offered: WSp.

EDSPE 513 Principles of Clinical Appraisal for Teachers of Exceptional Children (3) *Jenkins, Madge* Diagnostic instruments used in the clinical appraisal of exceptional children. Theoretical and measurement considerations are used to buttress practical experiences in appraisal related to intervention. Offered: AS.

EDSPE 514 Fundamentals of Reading for Children with Disabilities (3) *Jenkins, Madge* Emphasis on basic prereading and reading skills, such as phonics and structural analysis, specifically for the disabled child. Acquisition of comprehension skills by the disabled. Diagnosis of reading problems, published materials appropriate for children with disabilities, material modification. Offered: W.

EDSPE 515 Problems and Issues in Special Education (3, max. 9) Intensive examination of the issues pertinent to special education, such as legislation, interdisciplinary functions, and the role of special education in general education and placement practices. Offered: Sp.

EDSPE 517 Practicum in Research Design and Analysis in Special Education (1-3, max. 9) Critical analysis of current research in special education and related fields serves as background for designing applied research projects. Projects are examined, evaluated, and revised in seminar discussion. Prerequisites: EDPsy 490 and 591 or equivalent and permission of instructor. Offered: AWSpS.

EDSPE 518 Seminar in Special Education Research (1-3, max. 9) Designed for doctoral students in special education during their first year of residency. Each candidate selects a dissertation problem and submits a proposal. Topics such as the procurement of subjects, the reporting and communication of research findings, and the evaluation of research are stressed. The seminar leads to the evolution of a viable dissertation proposal. Credit/no credit only. Offered: AWSp.

EDSPE 520 Seminar in Applied Special Education (1-12, max. 12) *Schwartz, Thompson* Designed for graduate students in special education. Focus on contemporary topics relating to the application of the theoretical constructs to special education. Offered: AW.

EDSPE 521 Communication and Language in Young Exceptional Children (3) *Schwartz* Review and discussion of theories of language acquisition as they relate to communication and language in young exceptional children. Review of research of language environments that relate to early literacy and education and how to use this information to modify environments for special needs children. Offered: jointly with EDPsy 519; W.

EDSPE 522 Seminar on the Education of Students with Severe Disabilities (3) *White* Advanced graduate seminar arranged to study and discuss the essential components of providing a comprehensive approach to the identification and education of infants, children, adolescents, and young adults with severe disabilities. Offered: W.

EDSPE 523 Specific Numeracy Techniques for Elementary Students with Mild Disabilities (3) *Madge* Provides the teacher with specific techniques for teaching numeracy to elementary students with mild disabilities in inclusive settings. Prerequisites: EDTEP 522 or equivalent. Offered: SpS.

EDSPE 525 Educating Students with Autism or Severe Behavior Disorders (3) *DeVault* Consideration of the identification, etiology, education, and progress of individuals with autism or other severe behavior disorders. Offered: Sp.

EDSPE 526 Techniques for Instructing Social Behaviors for Elementary Students with Mild Disabilities (4) *Neel* Provides prospective and existing teachers with specific techniques to promote social competency in elementary children with mild disabilities. Exploration of various courses of disorder behavior and discussion of research related to specific interventions. Development of individual and classroom instructional plans for teaching social skills. Offered: AS.

EDSPE 541 Education of Children with Behavior Disorders (3) Introductory course covering characteristics of children with behavior disorders; introduction to the various theoretical approaches to education practices. Offered: W.

EDSPE 542 Introduction to Mental Retardation (3) *Billingsley* Introductory course on intellectual disabilities and the challenges they present to individuals with such disabilities, the community, the schools, and society. Offered: Sp.

EDSPE 545 Instructional Modifications for the Education of Children with Mild Disabilities (3) *Lovitt* In-depth analysis and application of several modifications of instructional techniques necessary for the education of students with mild disabilities. Offered: W.

EDSPE 546 Seminar in Educating Children with Behavior Disorders (3, max. 9) *Neel* Advanced-level seminars focus on contemporary research topics relating to the effective education of children with serious behavior disorders. Students analyze and review research pertinent to the chosen topics and prepare a scholarly manuscript for dissemination. Offered: W.

EDSPE 548 Special Topics in the Education of the Learning Disabled (3, max. 12) In-depth analysis of empirical findings in the specialty of learning disabilities with focus on the synthesis of research findings and their application to the educational environment. A paper suitable for publication required. Prerequisite: course in learning theory, introductory course in learning disabilities, or equivalent preparation.

EDSPE 551 Grant Proposal Writing—Special Education (3) Doctoral level seminar focusing on the preparation of research grant proposals in Special Education and related fields. Students utilize computer data bases to locate funding sources and prepare competitive applications. Peer and instructor feedback based on application criteria provided weekly. Credit/no credit only. Prerequisite: doctoral standing in EDSPE or permission of instructor.

EDSPE 561 Educational Assessment of Young Children with Special Needs (3) *Janko, Schwartz* Special standardized and educational measurement and evaluation procedures for use with young children with a variety of disabling conditions. Administration, evaluation, and programming strategies are discussed in combination with practical application of the skills within an educational framework. Offered: AW.

EDSPE 562 Curricula for Preschool Children with Disabilities (3) *Schwartz* Basic theoretical models and approaches to curricula for preschoolers with disabilities. Promote specific preschool curricula and develop skills to assist students in critiquing and evaluating curricula. How to adapt materials for specific populations and to plan a program for exceptional preschoolers. Offered: Sp.

EDSPE 563 Issues in Working with Families of Young Children with Special Needs (3) *Janko* Adjustment of parents to the birth of an infant with disabilities. Transactions that occur between parents and their infant, procedures that facilitate the infant's development through these interactions. How to assist families in interacting with professionals in the assessment, IFSP process. Offered: W.

EDSPE 565 Seminar: Early Childhood Education for Children with Disabilities (3, max. 9) *Janko* Advanced seminar on early childhood education for the disabled. Historical and current research from appropriate specialties in special education reviewed; research from related fields is reviewed in terms of its application to the education of young children with disabilities. Offered: Sp.

EDSPE 566 Current Research in Early Childhood Special Education (2, max. 6) Introduces students to theory and current research related to early intervention with infants and toddlers and how to evaluate research articles. Selected topics cover typical and atypical development in the areas of cognitive, social communication, and social development, as well as issues in assessment, curricula, and intervention strategies.

EDSPE 599 Independent Studies in Education (*) Independent studies or readings of specialized aspects of education. Registration must be accompanied by a study prospectus endorsed by the appropriate faculty adviser for the work proposed. Entry code required. Offered: AWSpS.

EDSPE 600 Independent Study or Research (*) Registration must be accompanied by a study prospectus endorsed by the appropriate faculty adviser for the work proposed. Entry code required. Offered: AWSpS.

EDSPE 601 Internship (3-9, max. 9) Prerequisites: graduate standing and permission based on prearrangement of internship placement and approval by adviser. Entry code required. Offered: AWSpS.

Teacher Education Program

EDTEP 501 First Quarter Field Experience—Elementary (2) Field experience and small group discussions accompanying the first quarter of study in the Elementary Teacher Education Program. Two weeks full-time during the quarter in supervised school placements. Credit/no credit only. Prerequisite: Elementary TEP student.

EDTEP 502 Second Quarter Field Experience—Elementary (3) Field experience and small group discussions accompanying the second quarter of study in the Elementary Teacher Education Program. Four weeks full-time during the quarter in supervised school placements. Credit/no credit only. Prerequisite: Elementary TEP student.

EDTEP 503 Third Quarter Field Experience—Elementary (4) Field experience and small group dis-

discussions accompanying third quarter of study in Elementary Teacher Education Program. Observe school year opening full-time for approximately one month in August and September and spend five weeks full-time during the quarter in supervised school placements. Credit/no credit only. Prerequisite: Elementary TEP student.

EDTEP 504 Fourth Quarter Field Experience—Elementary (9) Field experience during the fourth quarter of study in the Elementary Teacher Education Program. Full time student teaching in supervised school placements. Credit/no credit only. Prerequisite: Elementary TEP student.

EDTEP 505 Fifth Quarter Field Experience—Elementary (2) Field experience accompanying the fifth quarter of study in the Elementary Teacher Education Program. School placements and small group discussions. Credit/no credit only. Prerequisite: Elementary TEP student.

EDTEP 511 School and Society (3) Exploration of issues regarding schooling and society, such as matters of value and value tension in American schools. Consideration of social values such as equality, opportunity, pluralism, and community; historical and contemporary evidence of values in schooling; and how values can conflict in policy and practice. Prerequisite: Elementary TEP student.

EDTEP 521 Topics and Issues in Numeracy (3) Focus on mathematics from the perspective of the learner and on the meaning of understanding a mathematics concept. Examination of cultural aspects of the development of these concepts. Prerequisite: Elementary TEP student.

EDTEP 522 Teaching and Learning in Numeracy (3) Focus on pedagogy of mathematics. In conjunction with field experience, students extend understanding of mathematics and successfully integrate mathematics as a tool for learning science and art. Prerequisite: Elementary TEP student.

EDTEP 523 Teaching and Learning in Science (3) Science teaching in a manner consistent with how young children learn science concepts and skills. Opportunities are provided for work on science activities similar to those used with elementary school children and to experience many of the problems and successes of preadolescents. Prerequisite: Elementary TEP student.

EDTEP 531 Topics and Issues in Literacy (3) Investigation of the multiple natures of literacy development. Students study the impact of culture and family on literacy development by reading and discussing a variety of texts while also experiencing the development of their own learning through literature study, the writing process, and oral presentations. Prerequisite: Elementary TEP student.

EDTEP 532, 533 Teaching and Learning in Literacy I, II (3,3) Introduces participants to the content and process of literacy learning in elementary school. Study of abilities needed for effective literacy use, instructional strategies to help children acquire these abilities, and assessment strategies to evaluate student progress. Prerequisite: Elementary TEP student.

EDTEP 541 Dilemmas of Teaching and Learning in Elementary School (3) Covers human learning in the elementary school setting with emphasis on discipline-specific cognition and cognitive development. Prerequisite: Elementary TEP student.

EDTEP 542 Meeting the Needs of All Students—Elementary (4) Overview of physical, cognitive, and social development of elementary school age children. Discussion of ways in which differences in development may affect children in school. Provides elementary teachers with understanding of how to facilitate the success of all children in general education classrooms. Prerequisite: Elementary TEP student.

EDTEP 543 Integrating Social Studies and the Arts (3) Introduction to objectives, content, and teaching strategies of social studies and the arts as taught in elementary school. Emphasis on integration of the two subjects, as well as other curricular areas, within the context of instructional units. Prerequisite: Elementary TEP student.

EDTEP 551 Introduction to Multicultural Education (2) Concepts, theories, and strategies that constitute major dimensions of multicultural education. Focus on racial and ethnic groups, social class, and gender. Dimensions of multicultural education examined include content integration, knowledge construction process, prejudice reduction, equity pedagogy, and empowering school culture and social structure. Prerequisite: TEP student.

EDTEP 552 Assessment in Elementary Education (3) Emphasis on methods of assessment that reinforce understanding of the various disciplines. Includes performance assessments, assessments of student projects and papers, traditional exams, and observational exams. Prerequisite: Elementary TEP student.

EDTEP 561 Dilemmas of Teaching and Learning (5) Study of human learning in an educational setting, with an emphasis on learning of school subjects. Topics include nature of learning, knowledge and teaching, motivation, culture, and cognition. Prerequisite: Secondary TEP student.

EDTEP 562-563 Adolescent Development and Education I-II (3-3) Overview of trends and issues of adolescent development and behavior in relation to contemporary secondary schooling. Psychological perspectives on adolescent identity, interpersonal relationships, academic engagement, and social deviance in schools examined with special attention to classroom management and accommodating differences. Prerequisite: Secondary TEP student.

EDTEP 565 Planning and Teaching an Integrated Curriculum (3) Introduction of models for integrating curriculum, congruent instructional and assessment strategies, and team planning skills. Provides direct and experiential learning activities and results in production of team-planned curricular units based on two different models of curriculum integration. Prerequisite: Secondary TEP student.

EDTEP 571 Topics and Tensions in School and Society (3) Exploration of issues of value and value tension in American schools. Consideration of social values of equality, opportunity, pluralism, and community; historical and contemporary evidence of values in schooling, and how values can conflict in policy and practice. Prerequisite: Secondary TEP student.

EDTEP 573 Assessment in Secondary Education (3) Strong emphasis on methods of assessment that reinforce understanding of the various disciplines, including performance assessments, assessments of student projects and papers, traditional exams, and observational exams. Prerequisite: Secondary TEP student.

EDTEP 580-581 Teaching English and Language Arts in Secondary School I-II (5-3) Teaching of English and Language Arts in middle, junior, or senior high school. Prerequisite: Secondary TEP student.

EDTEP 582-583 Teaching Mathematics in the Secondary School I-II (5-3) Teaching of mathematics in middle, junior, or senior high school. Prerequisite: Secondary TEP student.

EDTEP 584-585 Teaching Social Studies in the Secondary School I-II (5-3) Developing, teaching, and evaluating social studies courses on the middle, junior, and senior high school levels. Prerequisite: Secondary TEP student.

EDTEP 586-587 Teaching Science in the Secondary School I-II (5-3) Teaching of science in middle,

junior, or senior high school. Prerequisite: Secondary TEP student.

EDTEP 588-589 Teaching World Languages I-II (5-3) Introduction to currently used foreign language teaching methods and approaches, including learning and teaching strategies and techniques for the four skills—reading, writing, speaking, listening—and culture. Current and future trends in pedagogy and technology. Prerequisite: Secondary TEP student.

EDTEP 591 First Quarter Field Experience—Secondary (3) Field experience and small group discussions accompanying the first quarter of study in the Secondary Teacher Education Program. Observe school year opening full-time for approximately one month in August and September and two weeks full-time during the quarter in supervised school placements. Credit/no credit only. Prerequisite: Secondary TEP student.

EDTEP 592 Second Quarter Field Experience—Secondary (3) Field experience and small group discussions accompanying the second quarter of study in the Secondary Teacher Education Program. Three weeks full-time during the quarter in supervised school placements. Credit/no credit only. Prerequisite: Secondary TEP student.

EDTEP 593 Third Quarter Field Experience—Secondary (3) Field experience and small group discussions accompanying third quarter of study in Secondary Teacher Education Program. Four weeks full-time during the quarter in supervised school placements. Credit/no credit only. Prerequisite: Secondary TEP student.

EDTEP 594 Fourth Quarter Field Experience—Secondary (9) Field experience during the fourth quarter of study in the Secondary Teacher Education Program. Full-time student teaching in supervised school placements. Credit/no credit only. Prerequisite: Secondary TEP student.

EDTEP 595 Fifth Quarter Field Experience—Secondary (3) Field experience accompanying the fifth quarter of study in the Secondary Teacher Education Program. School placements and small group discussions. Credit/no credit only. Prerequisite: Secondary TEP student.

Independent Study, Research, and Field Experiences

EDUC 301 Introductory Practice in Community Service Activity (3) Observation and participation in a variety of activities in a K-12 classroom, placement made according to participant interests and needs. Sixty hours of scheduled participation plus scheduled seminars are required. Prerequisites: application during quarter prior to participation, permission of instructor. Offered: AWSp.

EDUC 401 Practicum in Community Service Activity (3-18) Tutoring and teaching experiences in a school or community service organization, placement made according to participant interests and needs. Approximately twenty hours of participation on a predetermined schedule plus scheduled seminars are required for each credit earned. Prerequisites: application during quarter prior to participation and permission of instructor. Offered: AWSp.

EDUC 501 Advanced Practicum in Community Service Activity (3-18) Selective, in-depth participation and teaching experiences for postbaccalaureate students in a community service organization. Approximately twenty hours of participation plus scheduled seminars are required for each credit earned. Participants wishing to use advanced community service experience to satisfy, in part, graduate program requirements should make such arrangements prior to enrollment with their faculty adviser and the Director of

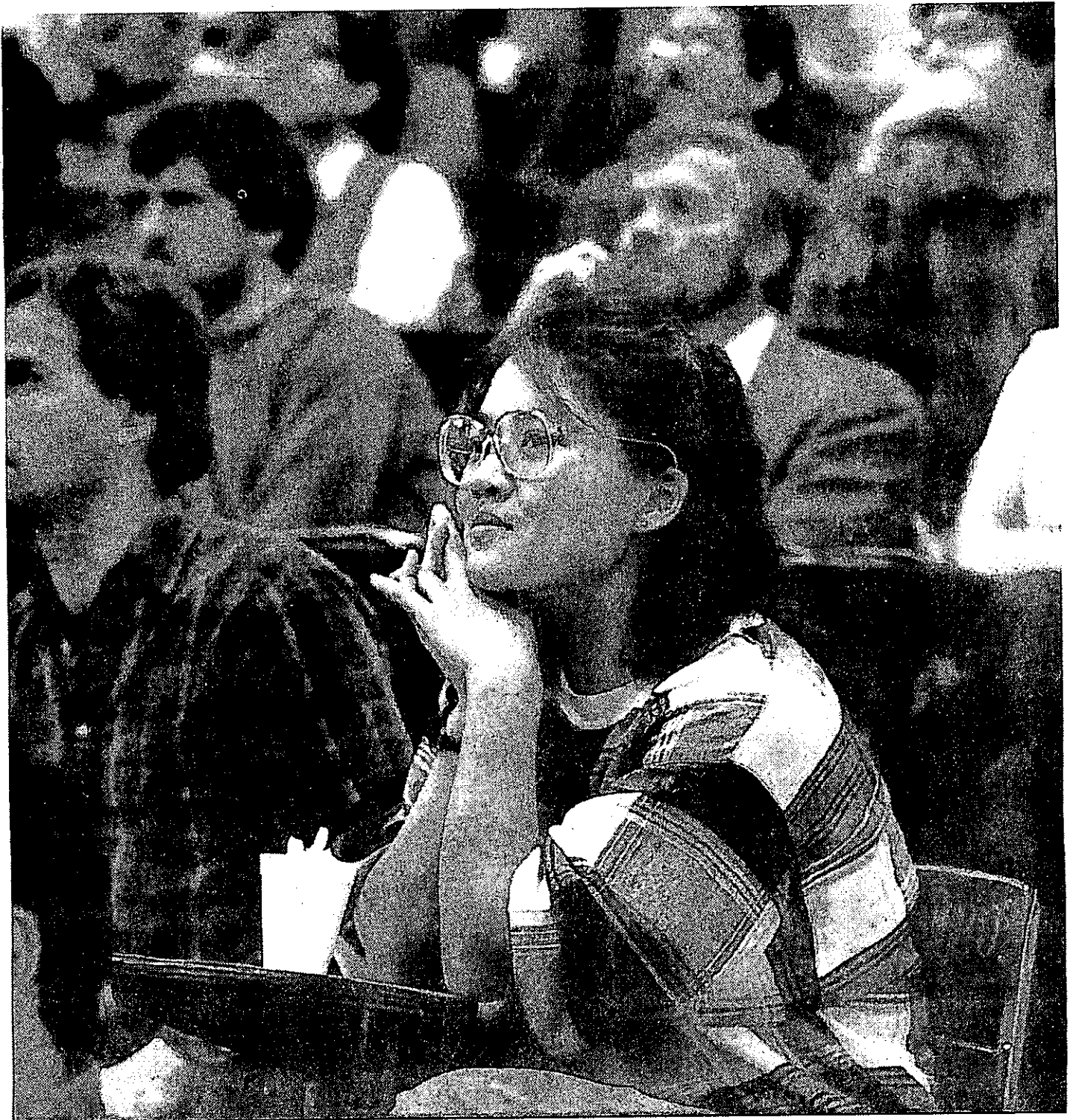
Certification. Prerequisites: application during quarter prior to participation and permission of instructor. Offered: AWSp.

EDUC 502 Advanced Practicum in Classroom Teaching and Management (3-18) Designed to provide postbaccalaureate students with student teach-

ing and certificated teachers with selective, in-depth classroom participation experiences. Participants wishing to use the advanced teaching practicum to satisfy, in part, graduate program requirements should make such arrangements prior to enrollment with their adviser and the Director of Certification. Prerequisites: application during quarter prior to participation and permission of instructor. Offered: AWSp.

EDUC 700 Master's Thesis (*) Prerequisites: permission of supervisory committee chairperson and graduate program coordinator. Offered: AWSp.

EDUC 800 Doctoral Dissertation (*) Prerequisites: permission of Supervisory Committee chairperson and graduate program coordinator. Offered: AWSp.



College of Engineering

Dean

J. Ray Bowen
371 Loew

Associate Deans

Mark J. Damborg
Dorothy A. Reed
Keith A. Holsapple

Engineering is an increasingly critical societal enterprise. More than ever before, the engineer is challenged both to design products whose value is high by social and economic measures and to provide for efficient manufacture of such products within the constraints of environmental protection and diminishing raw material resources. Requirements imposed on the transportation system and other elements of society's physical infrastructure pose analogous challenges. At the same time, reductions in computer costs and increases in sophistication are dramatically influencing both the products and processes designed by the engineer and the actual practice of engineering.

The primary goal of the College of Engineering educational programs is to prepare students for a professional career in engineering by providing the technical foundation required for success in industry, government, or academia. Other goals of the College are to instill within its students the highest ethical standards, the capability for lifelong learning, and a curiosity about the world. Excellence in undergraduate and graduate academic programs will remain the College's highest priority.

For undergraduates, the College of Engineering offers a flexible curriculum that not only accommodates varied student needs, both in established departmental programs and interdisciplinary studies, but also culminates in a major, meaningful design experience. The College also offers active educational and research programs, both departmental and interdisciplinary, at the graduate levels. (See Interdisciplinary Engineering Studies Program for interdisciplinary undergraduate and graduate programs.)

The College of Engineering has been a major unit of the University since 1899; the first engineering degrees were authorized in mining engineering and metallurgical engineering in 1898. Degrees were added for civil engineering (1901), electrical engineering (1902), mechanical engineering (1906), chemical engineering (1907), ceramic engineering (1919), aeronautical engineering (1929), industrial engineering (1986), and computer engineering (1987). A degree program in technical communication was implemented in 1991. In 1994, 1,706 upper-division undergraduate majors and 1,266 graduate students were enrolled in engineering programs taught by a faculty of 205 members.

College Facilities

Teaching and research activities of the College are conducted in thirteen major campus buildings (and portions of others), which contain the College's offices, classrooms, and research and teaching laboratories. The Engineering Library, a branch of the University Libraries, provides outstanding collections of books, periodicals, technical reports, and patents of interest to engineers. Computers and terminals are available in all departments and at the University's Academic Computer Center.

Presently under construction is an addition to the existing Electrical Engineering building which will house the

two departments of Electrical Engineering and Computer Science and Engineering. It is anticipated that the new facility will be available for instruction during winter quarter 1997.

Student Organizations and Activities

All of the major professional engineering societies have student chapters on campus, and all engineering students are encouraged to join the chapter that represents his or her field of interest. The College also has student chapters of the Society of Women Engineers, American Indian Science and Engineering Society, National Society of Black Engineers, and the Society of Hispanic Professional Engineers. The Pre-Engineering Student Association (PESA) is the major College-wide organization for all students enrolled in a pre-engineering course of study but not yet admitted to a department. The Engineering Student Council, comprising student representatives from all departments and professional societies, is the major, College-wide student organization and participates actively in College affairs. Honor societies open to engineering students are Tau Beta Pi and Sigma Xi.

Students serve with faculty members on engineering policy committees which make recommendations concerning instructor evaluation, curriculum revisions, advising, grading systems, and other matters of interest to students and faculty.

Financial Aid

The College offers financial assistance to undergraduates through industrial scholarships and loan funds. Scholarship information is available at the College Advising Center, 353 Loew, at the Office of Academic Affairs, 356 Loew, and at the Office of Student Financial Aid, 105 Schmitz. Most scholarships are given after a year or more in residence by the student.

Honors Program

356 Loew

Coordinator, Betty Becraft

The College of Engineering Honors Program offers students of outstanding performance and achievement a course of study designed to provide intellectual challenge in a stimulating learning atmosphere which draws on the resources of a large diversified university. Students entering the Honors Program become candidates for the degree "With College Honors" or "With Distinction."

The College Honors Degree

Students who complete this program receive a degree "With College Honors."

The College Honors degree requires that students participate in the University Honors Program while they take engineering prerequisites in the College of Arts and Sciences. When these students are admitted to engineering departments, they may be nominated to enroll in the Engineering Honors Program. Completion of the College Honors degree involves both an honors general education component and advanced honors work completed after students have been admitted to the College of Engineering.

Admission requirements: 3.30 cumulative GPA, minimum departmental GPA, and participation in the University Honors Program as a pre-engineer.

Graduation requirements: The College Honors curriculum consists of two parts; a general education component and a component in the student's major department. The general education component is completed while the student is in the College of Arts and Sciences prior to application to the College of Engineering. Students select three sequences, each three quarters long, from Honors A&S courses, the Natural World, and Mathematics (selecting at least one from each):

The second component begins when a student is admitted to an engineering department. Students then select a minimum of 9 credits of honors courses from either College or departmental 498H and 499H course work.

The Departmental Honors Degree

Students who complete this program receive a degree "With Distinction."

Admission Requirements: 3.30 cumulative GPA, minimum departmental GPA.

Graduation Requirements: Students are nominated for the Departmental Honors Program when they have been in their departments for a minimum of one quarter. Students are required to select a minimum of 9 credits of honors courses from either College or departmental 498H and 499H course work.

At present, departmental honors degrees are offered in the following degree programs: Bioengineering, Civil Engineering, Chemical Engineering, Computer Engineering, Electrical Engineering, Industrial Engineering, Materials Science and Engineering, Mechanical Engineering, and Technical Communication.

Foreign Study

Given the increased likelihood that engineering students will have overseas work experiences or will do business with international clients and competitors, the College encourages students to study foreign languages in addition to their engineering course work and to take advantage of opportunities for study in foreign universities either at the undergraduate or graduate level. The College has active exchange agreements with approximately fifty-nine universities in twenty-four countries. Foreign language courses at the third-quarter level or above (e.g., GERMAN 103) may be applied toward VLPA distribution. Students may contact the Office of Academic Affairs, 356 Loew, for information about opportunities for foreign study.

Undergraduate Program

The College of Engineering provides curricula that offer a variety of educational experiences to its students. The curricula also facilitate transfer from community colleges and from other four-year colleges and universities.

Students planning to major in engineering begin as pre-engineering majors in the College of Arts and Sciences. As a pre-engineering major, a student will take the mathematics, chemistry, physics, English composition, and other courses prerequisite for admission to the desired engineering departmental program. In addition, courses in the Visual, Literary, & Performing Arts and Individuals & Societies will be taken.

Students who indicate an interest in engineering on their University admission application are assigned pre-engineering status. Students without pre-engineering status who wish to pursue an engineering degree may have their coding changed to pre-engineering upon request at the Undergraduate Advising Center.

Admission

Admission requirements vary for departments or programs within the College of Engineering. Some departments or programs offer early admission, while others do not. For specific up-to-date information regarding the admission requirements for a department or program, the applicant should contact the undergraduate adviser for the department or program directly. In addition, all departments and programs within the College provide up-to-date course and admission information on the World Wide Web.

For general upper-division admission, students must apply to the engineering department or program after

completion of the prerequisite courses for the program, with at least 64 credits applicable to the degree program. In general, the prerequisite courses include one year of calculus, differential equations, one or two quarters of inorganic chemistry, two to three quarters of physics, and English composition. The Engineering Advising Center or the individual department or program may be consulted for a listing of specific entrance requirements. All engineering departments and programs have enrollment quotas, and admission is on a competitive basis.

Admission for the Disadvantaged

While the sole purpose of the admission requirement is to limit enrollment to a number that can be taught well with the resources available, the College recognizes that this may eliminate some disadvantaged students whose potential is high but who, through extenuating background circumstances, have had limited access to early education that provides adequate experience in abstract reasoning. For purposes of special consideration for admission, a disadvantaged student is defined as one who (1) is economically disadvantaged as shown by eligibility for a Basic Need Grant on the National Financial Aid Program, or (2) is educationally disadvantaged, having attended a school without a full and available complement of college preparatory work, or (3) has ethnic minority status with a group showing historic underrepresentation in the field of engineering. These students are encouraged to apply for admission to departments and to attach to their application a letter to the admissions committee that provides information on the applicant that is relevant to the admission decision.

Recommended High School Preparation

Substantial high school preparation in mathematics, physical science, and communication is essential for entrance to engineering studies. Required and recommended courses may be determined from the Engineering Advising Center.

Engineering Advising Center

353 Loew

Students are urged to contact the Engineering Advising Center for program, course, or career information and discussion. The Center assists any student interested in planning the initial portion of an engineering degree program, and distributes information about prerequisites for application for admission to one of the departments in the College. A student who is interested in engineering is urged to identify engineering as the intended major while still in the College of Arts and Sciences and to seek advice in the Center.

Types of Programs

The College offers three basic programs leading to Bachelor of Science degrees:

Departmental Major. This program leads to a Bachelor of Science degree in a designated field of engineering (e.g., Bachelor of Science in Civil Engineering). It is designed for students who intend to practice as professional engineers in a standard branch of engineering or who plan to undertake graduate study in that field. The curricula for these degrees are accredited by the Accreditation Board for Engineering and Technology (ABET), the principal engineering accrediting agency in the United States. Accreditation requirements stipulate certain course distribution requirements for the undergraduate degree. A description of how each of the accredited baccalaureate programs meets the ABET requirements is available from the department office and from the Engineering Advising Center. Accredited four-year curricula leading to baccalaureate degrees are offered in aeronautics and astronautics and in ceramic, chemical, civil, computer, electrical, industrial, mechanical, and metallurgical engineering.

Application to a department or program at the upper-division level is made at the time that lower-division requirements are satisfied. Currently, enrollment limits imposed by faculty size and laboratory/classroom space available are such that entry into a specific department or program may be competitive. In general, a student applicant must demonstrate scholastic aptitude, as evidenced by the attainment of grades whose average is 2.5 or above (depending upon the program) in mathematics, the Natural World, English composition, and other courses. The student is urged to plan ahead by learning the intended department or program requirements and particularly by noting which requirements must be fulfilled by the time the application is made.

Nondepartmental Professional Program. This program leads to a Bachelor of Science in Engineering degree and is designed for students who have well-defined, special educational objectives that departmental programs do not satisfy. Graduates can practice as professional engineers in newly developing fields, or they may embark on graduate study in these or allied fields (see Engineering Interdepartmental Curricular Program).

Nonprofessional Program. Leading to a Bachelor of Science degree, this program is intended for students who wish to have significant exposure to science and engineering courses, but who do not plan to engage in professional engineering practice (see Engineering Interdepartmental Curricular Program).

Graduation Requirements

To graduate, students must meet or exceed the requirements of the University, the College, and their particular program or department. College requirements are listed in this section, and program or departmental requirements are given in the specific section that describes that program or department.

All departments of the College have continuation policies that specify a minimum rate of progress as well as minimum academic performance levels. These policies may be more restrictive than those generally applied by this university and may change in time. Information on current policy is available at the departmental offices.

Selecting courses that fulfill graduation requirements is the responsibility of each individual. Students are urged to check carefully the course and credit requirements of the program in which they are enrolled.

The College requires a minimum number of credits within certain areas of study and some specific courses within certain areas. All programs require:

General Education Requirements: 85 Credits

Areas of Knowledge: 49 Credits

Visual, Literary, & Performing Arts and Individuals & Societies: 24 credits minimum. Some programs within the College require 30 credits. Visual, Literary, & Performing Arts (VLPA) includes courses in literature, art, music, drama, etc., which stress the essential qualities of individual forms of expression. First- and second-quarter language courses may not be counted toward the VLPA requirement. Individuals & Societies includes courses in history, economics, psychology, sociology, etc., which stress the social nature of mankind and the development and analysis of societies and/or social institutions. Courses that count toward these requirements are identified as VLPA or I&S in the *General Catalog* and in the quarterly *Time Schedule*. A minimum of 10 credits is required in each area. Also required is one in-depth sequence consisting of two or more related courses.

Natural World: 25 credits. Specifically required are chemistry (10 credits): CHEM 140, 141, and above; and physics (15 credits): PHYS 121/131, 122/132, 123/133.

Mathematics: 24 Credits

Specifically required are MATH 124, 125, 126, 307 and 308. The remaining 3 credits are specified or recommended by the department or program.

Written and Oral

Communication: 12 Credits

One 5-credit English composition course from the approved University list. ENGR 231 Introduction to Technical Writing (3 credits) and ENGR 333 Advanced Technical Writing and Oral Presentations (4 credits, or department approved alternative).

Engineering Departmental Course of Study: 95 Credits

Major departments or specific programs will require at least 95 credits in their curricula. These course sequences were developed to culminate in a major, meaningful design experience.

Special Programs

Cooperative Education and Minority Internship Program

353 Loew

Director, Helene Beaver

The Cooperative Education and Minority Internship Program provides the opportunity for pre-engineering students and all departmental students to combine practical, full-time, on-the-job engineering experience with alternate periods of full-time academic study. Advantages of participation in this program include assistance for the student in deciding which branch of engineering to follow; additional income to help defray college expenses; relevance and motivation for study based on real engineering work; and work experience and employment contacts that may result in a higher starting salary after graduation.

Information may be obtained from the Director of Cooperative Education, College of Engineering, Box 352180.

Continuing Education Programs

Fulfilling a commitment to lifelong learning, the College of Engineering offers courses, workshops and conferences to respond to the professional development needs of practicing engineers and related technical professionals worldwide. Through Engineering Professional Programs (EPP) and Televised Instruction in Engineering (TIE) thousands of practicing engineers update their technical knowledge or pursue advanced degrees each year. For more information contact: Engineering Professional Programs, 543-5539 or Televised Instruction in Engineering at 685-2242.

Special Facilities

Office of Engineering Research

Coordinator, Mary Heusner
372 Loew

The Office of Engineering Research promotes, stimulates, and coordinates research in all fields of engineering. Its primary role is to maintain records of grant and contract proposals and awards. It also allocates limited resources to College units to increase the number and quality of research grants and contracts in the College of Engineering.

Interdisciplinary Engineering Studies Program

356 Loew

The College of Engineering directly administers non-departmental undergraduate and graduate degree programs, all of the College's lower-level courses, and upper-level courses not encompassed by regular departmental offerings. These courses are designated ENGR; in general, ENGR courses are supervised and taught by College of Engineering faculty members.

Undergraduate Programs

360 Loew

Coordinator, Betty Becraft

The Interdisciplinary Engineering Studies (IES) Program is intended for students whose desired course of study does not fall within one of the traditional engineering departments. An interdisciplinary program combines in-depth course work from two or more departments. Although course work may involve departments outside the College of Engineering, the major thrust must be in engineering.

The IES Program offers a nonprofessional degree program leading to the Bachelor of Science (B.S.) and a professional degree program for the Bachelor of Science in Engineering (B.S.E.).

Due to the uniqueness of each interdisciplinary student's program of studies; the B.S. and B.S.E. degrees are not accredited by the American Board of Engineering and Technology (ABET). The experience requirement to obtain a professional engineering license is two years longer for a B.S.E. graduate, except in surveying, than for a graduate of an accredited program. A B.S. graduate is not eligible for a professional engineering license.

Interdisciplinary students develop personal programs of study approved by a faculty adviser with similar interests. Programs are reviewed and approved by the Interdisciplinary Committee which oversees all interdisciplinary study programs. Contact the Office of Academic Affairs at 543-8590 for information on established procedures and applications for entry into the B.S.E. and B.S. programs. Entrance requirements and the continuation policy for participation in these programs are consistent with those of other departments in the College.

Bachelor of Science in Engineering

A typical B.S.E. program could: combine course work from civil and mechanical engineering and oceanography for a program in ocean engineering; course work from civil and chemical engineering to form a program in environmental engineering; or course work from one or more of the engineering programs and from physics for a program in engineering physics. Admission into this program (usually after completion of 90 credits) is competitive with a GPA of at least 2.80 in technical courses required for entry. A minimum of 75 credits must be completed after entering the program before a B.S.E. degree is awarded.

Bachelor of Science

The nonprofessional Bachelor of Science degree provides greater flexibility than does the Bachelor of Science in Engineering degree. It can be an excellent base for subsequent professional studies in law, medicine, or business. It may also be the primary educational objective in such fields as technical writing, engineering sales, or environmental studies. Detailed

requirements are available from the coordinator in the Office of Academic Affairs.

Graduate Programs

The College also offers graduate programs leading to the Master of Science in Engineering, Master of Engineering, and Master of Science degrees, without designation of a specific major.

Approved programs lead to the M.S.E. degree in civil, mechanical, electrical, chemical, and interengineering; an approved program leads to the M.Eng. degree in aeronautics and astronautics; and approved programs lead to the M.S. degree in civil engineering, interengineering, and materials science and engineering. Admission requires a B.S. degree in engineering, mathematics, or physical science and evidence of aptitude for graduate study. Submission of scores on the Graduate Record Examination is required.

Master of Science in Engineering

The Interengineering Master of Science in Engineering (M.S.E.) and Master of Science (M.S.) program is intended for students whose desired course of study includes two or more engineering departments and may also include study in departments outside the College of Engineering. Applications and files of students entering the M.S./M.S.E. option are handled in the office of the Associate Dean for Academic Affairs. Admission to the interengineering option requires a statement describing the applicant's objectives. This statement should state why students want to enter the M.S./M.S.E. program rather than one of the traditional engineering graduate programs. Applicants to the M.S./M.S.E. program must have well-defined educational objectives which cannot be satisfied by established engineering programs. Graduation and entrance requirements, which differ for the various programs, may be obtained from the Office of Academic Affairs, College of Engineering, 543-8590.

Program in Engineering and Manufacturing Management—PEMM Fellows

For students interested in a career in manufacturing management, PEMM offers a two-year (24-month) joint degree program leading to both M.B.A. (Master of Business Administration) and M.S.E. (Master of Science in Engineering) degrees. PEMM applicants must apply to the M.B.A. Program, the M.S.E. Interengineering Program, and the PEMM Program. Prospective students must take both the GRE and GMAT examinations before applying. The Graduate Program Office in the School of Business must receive all M.B.A. applications by March 1. The deadline for submitting M.S.E. and PEMM applications to the College of Engineering is March 1. Graduation and entrance requirements may be obtained from: Office of the Dean for Academic Affairs, College of Engineering, (206) 543-8590 and the Program in Engineering and Manufacturing Management (PEMM), (206) 685-7023.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

ENGR 100 Introduction to Design Engineering (5) I&S Introduction to design and communication principles through engineering project approach, stressing teamwork, design process, specialties and tools of engineering, creative and analytical thinking, professionalism and ethics, social, economic and political context, open-ended problems. Grading based on quality of engineering projects and presentation of design through written, oral, and graphical communication. Offered: AWSp.

ENGR 110 Career Planning I (1) Presentations by various faculty and staff members, students, and recent graduates offer an introduction to the College of Engineering, curricular options, fields of engineering, interdisciplinary programs, and information of general interest. Credit/no credit only. Limited to freshmen, sophomores, or transfer juniors. Offered: AW.

ENGR 123 Introduction to Engineering Graphics (4) NW Communicating technical information in engineering design and research: freehand sketching, use of instruments, layout drawings, projection theory, descriptive geometry, and basic dimensioning. Introduction to computer-aided design drafting. Offered: AWSp.

ENGR 142 Computer Programming for Engineers and Scientists I (4) NW/QSR Basic programming-in-the-small abilities and concepts. Highlights include procedural and functional abstraction with simple built-in data type manipulation. Basic abilities of writing, executing, and debugging programs. Not available for credit to students who have completed 141 or CSE 210. Offered: jointly with CSE 142; AWSps.

ENGR 170 Fundamentals of Materials Science (4) NW Fundamental principles of structure and properties of materials utilized in practice of engineering. Properties of materials are related to atomic, molecular, crystalline structure. Metals, ceramics, multiphase systems, and polymeric materials. Relationships between structure and electrical, mechanical, thermal, chemical properties. For advanced freshmen and sophomores. Prerequisite: CHEM 150 or permission of instructor. Offered: AWSps.

ENGR 197 Engineering Problem Solving (1, max. 12) Lectures and problem sessions in mathematics, chemistry, and physics with engineering applications. Enrollment restricted to Minority Science and Engineering Program (MSEP) students. Credit/no credit only. Offered: AWSp.

ENGR 199 Special Projects (1-3, max. 3) Students propose problems to solve to an engineering faculty member. The problems may be selected from the student's own experiences and interests, from the interest of the faculty member, or from other sources such as faculty or graduate students doing research projects, or from personnel in the physical medicine area, occupational therapy, hospital, industry, government. Corroboration by an engineering faculty member is required. Project suggestions are available. Offered: AWSps.

ENGR 202 Special Projects (1-3) Projects on topics of current interest in engineering. Prerequisite: permission of instructor. Offered: A.

ENGR 210 Engineering Statics (4) Vector analysis applied to equilibrium of rigid body systems and subsystems. Force and moment resultants, free body diagrams, internal forces, and friction. Analysis of basic structural and machine systems and components. Prerequisites: MATH 126 and PHYS 121. Recommended: graphics background. Offered: AWSps.

ENGR 215 Fundamentals of Electrical Engineering (4) Introduction to electrical engineering. Basic circuit and systems concepts. Mathematical models of components. Kirchhoff's laws. Resistors, sources, capacitors, inductors, and operational amplifiers. Solution of first and second order linear differential equations associated with basic circuit forms. Steady state sinusoidal excitation and phasors. Prerequisites: PHYS 122 and MATH 126. Offered: AWSp.

ENGR 220 Introduction to Mechanics of Materials (4) Introduction to the concepts of stress, deformation, and strain in solid materials. Development of basic relationships between loads, stresses, and deflections of structural and machine elements such as rods, shafts, and beams. Load-carrying capacity of these elements under tension, compression, torsion, bending, and shear forces. Prerequisite: 210. Offered: AWSps.

ENGR 230 Kinematics and Dynamics (4) NW Kinematics of particles, systems of particles, and rigid bodies; moving reference frames; kinetics of particles, systems of particles, and rigid bodies; equilibrium, energy, linear momentum, angular momentum. Prerequisite: 210. Offered: AWSpS.

ENGR 231 Introduction to Technical Writing (3) Principles of organizing, developing, and writing technical information. Report forms and rhetorical patterns common to scientific and technical disciplines. Technical writing conventions such as headings, illustrations, style, and tone. Numerous written assignments required. Required for all engineering majors. Prerequisite: all required ESL courses and one 5 credit composition course. Offered: AWSpS.

ENGR 250 Fundamentals of Engineering Economy (4) NW Basics of industrial cost analysis and accounting. Application of interest computations to engineering decision making. Analysis of engineering alternatives based on use of interest computations, valuations, depreciation, and cost estimates in process and product manufacturing. Offered: AWSpS.

ENGR 260 Thermodynamics (4) NW Introduction to the basic principles of thermodynamics from a macroscopic point of view. Emphasis on the First and Second Laws and their applications to engineering devices and thermodynamic cycles. Problem solving methodology. Prerequisites: MATH 126, PHYS 121, and CHEM 140. Offered: AWSpS.

ENGR 280 Introduction to System Engineering (4) Concepts of system approach, system hierarchies, functional analysis, requirements, trade studies, and other concepts used to define and integrate complex engineering systems. Prerequisite: 142. Offered: W.

ENGR 301 Creating the Future (3) I&S *Douthwaite* Examines the concept of alternative individual and societal futures and the opportunities for creating them. Many authors are reviewed, a number of scenarios for the future are explored, and several methods of forecasting are investigated.

ENGR 310 Social Constraints on Engineering Design (3) I&S Ways in which social goals affect engineering design decisions. Social values and public policy issues that generate design criteria using engineering cases such as space travel, energy conservation, nuclear waste disposal. For students from any discipline. Prerequisite: junior standing or permission of instructor.

ENGR 315 Probability and Statistics for Engineers (3) NW Application of probability theory and statistics to engineering problems, distribution theory and discussion of particular distributions of interest in engineering, statistical estimation and data analysis. Illustrative statistical applications may include quality control, linear regression, analysis of variance, and experimental design. Prerequisite: MATH 307. Offered: AWSpS.

ENGR 321- Engineering Cooperative Education (2-, max. 16) Engineering practicum; integration of classroom theory with on-the-job training. Periods of full-time work alternate with periods of full-time study. Open only to students who have been admitted to the Engineering Cooperative Education Program. Requires subsequent completion of ENGR 322 to obtain credit. Credit/no credit only. Offered: AWSpS.

ENGR 322 Engineering Cooperative Education Postwork Seminar (0) Reporting and evaluation of co-op work experience, and discussion of current topics in engineering. To be taken during the first quarter in school following each work session. Offered: AWSpS.

ENGR 323- Engineering Cooperative Education—Parallel (1-, max. 12) Engineering practicum; integration of classroom theory with on-the-job training. Part-time work concurrent with study. Open only to

students who have been admitted to Engineering Cooperative Education Program. Requires subsequent completion of ENGR 322 to obtain credit. Credit/no credit only. Offered: AWSpS.

ENGR 333 Advanced Technical Writing and Oral Presentation (4) Emphasis on the presentation of technical information to various audiences. Style of writing required for proposals, reports, and journal articles. Oral presentation principles, including use of visuals, as well as organizing and presenting an effective talk. Prerequisite: 231. Offered: AWSpS.

ENGR 341 Energy: Consumption Patterns, Fossil Fuels, and Conservation (3) NW *Woodruff* Survey of energy use, especially in the United States. Fossil fuels with emphasis on resource availability and on greenhouse effects and other environmental consequences. Methods for reducing consumption through conservation. Offered: jointly with PHYS 341; A.

ENGR 342 Energy: Nuclear and Solar Power (3) NW *Woodruff* Technology of nuclear power, especially fission power, and of the major forms of solar power, including hydroelectric power, wind power, and biomass. Consideration given to the factors limiting the utilization of these sources. Offered: jointly with PHYS 342; W.

ENGR 343 Environmental Radioactivity (3) NW *Woodruff* Sources of radioactivity in the environment, including both natural sources, especially radon, and manmade sources, especially nuclear power and nuclear explosions. Emphasis given to methods for determining radiation doses from the significant sources. Offered: jointly with ENV H/PHYS 343; Sp.

ENGR 351 Inventions and Patents (1) I&S Law and procedures for patenting inventions, employer-employee relationship, and trademarks. Primarily for engineering students. Prerequisite: junior standing. Offered: Sp.

ENGR 360 Introductory Acoustics (3) NW Introduction to propagation of acoustical waves; emphasis on propagation of sound waves in air, but material is applicable to propagation of sound waves in liquids, including underwater acoustics, and to propagation of stress waves in solids. Includes a historical development of acoustics, terminology, and units employed. Prerequisite: PHYS 123, MATH 307. Offered: Sp.

ENGR 401 Methods in Applied Mathematics I (4) NW Emphasis on acquisition of solution techniques; ideas illustrated, specific example problems arising in science and engineering. Applications of vector differential calculus, complex variables. Line, surface integrals; integral theorems; Taylor and Laurent series, contour integration. Prerequisites: MATH 205; MATH 328 or A A 370, and AMATH 351 or MATH 307 or permission of instructor. Offered: jointly with AMATH 401; A.

ENGR 402 Methods in Applied Mathematics II (4) NW See 401. Applications of ordinary differential equations; review of elementary concepts for first and second order equations; power series and Frobenius solutions. Laplace transforms; systems of differential equations, eigenvalues. Prerequisites: MATH 205; MATH 328 or A A 370; and AMATH 351 or MATH 307 or permission of instructor. Offered: jointly with AMATH 402; W.

ENGR 403 Methods in Applied Mathematics III (4) NW See 401. Application of partial differential equations; linear and quasilinear first order equations, characteristics; classification of linear second order equations; basic solution techniques for parabolic, elliptic, and hyperbolic equations; Green's functions and integral transform methods. Prerequisite: 402 or permission of instructor. Offered: jointly with AMATH 403; Sp.

ENGR 450 Gas Discharges for Plasma Processing and Other Applications (3) Nelson Lectures and demonstrations on direct-current and radio-frequency

electrical discharges for sputtering, plasma etching and other plasma processing applications. Prerequisites: MATH 307, PHYS 122.

ENGR 498 Special Topics in Engineering (1-5, max. 6) Offered: AWSpS.

ENGR 499 Special Projects in Engineering (1-3, max. 6) Offered: AWSpS.

Aeronautics and Astronautics

206 Guggenheim

Aeronautics and Astronautics deals with atmospheric and space flight and a broad spectrum of related engineering science. Established in 1930, the department offers a full complement of degree programs and is unique in the Pacific Northwest.

Undergraduate Program

Adam Bruckner, Undergraduate Program Adviser

Marlo Anderson, Undergraduate Program Coordinator

Bachelor of Science in Aeronautical and Astronautical Engineering

The department offers the Bachelor of Science in Aeronautical and Astronautical Engineering degree, based on a program of study of engineering science with emphasis on the design and development of vehicles operating within the atmosphere or space. The goals and objectives of the undergraduate program are: to provide a challenging and comprehensive education; to develop necessary functional skills and an understanding of the societal context in which engineering is practiced; to provide a solid foundation in the engineering sciences related to aerospace engineering; to develop engineering creativity through design experience; and to prepare graduates to succeed in engineering careers and lifelong learning. The program is accredited by the Accreditation Board for Engineering and Technology, and all graduates must meet certain specific distribution requirements.

Admission Requirements: Both early and upper-division admission are offered. Entrance requirement details, application deadlines, application forms, and advising literature may be obtained from the department office.

(1) Early Admission Group (EAG): Open to students enrolled at the UW who, prior to application, have completed 15 credits of mathematics at the level of MATH 124, 125, 126; 10 credits of physical science courses plus accompanying laboratory, at the level of PHYS 121/131, 122/132, 123/133 or CHEM 140, 141, 150, 151 or above; and 5 credits of English composition. A grade of at least 2.0 together with a GPA of 2.50 or higher must have been obtained in these courses, and at least 15 of the credits must have been taken at the UW.

Early admission students may start the autumn quarter, junior year program after meeting the requirements and standards for upper-division admission.

(2) Upper-Division Admission Group (UAG): Students must have completed 75 credits at the UW or their transfer equivalent, with a minimum overall GPA of 2.50 and a minimum grade of 2.0 in specific courses. Prior to admission, students must have completed MATH 124, 125, 126, 307; PHYS 121/131, 122/132, 123/133; CHEM 140, 141; ENGR 142, 210, 230, 260; and 5 credits of English composition.

Graduation Requirements: Students must complete a minimum of 180 credits distributed as follows:

General Education Requirements: 85 credits. These are listed under the College of Engineering and revised to allow a minimum of 24 credits in the Visual, Literary & Performing Arts, and Individuals & Societies. A A 370 is specified to complete the mathematics requirement.

Engineering Fundamentals: 24 credits. In addition to the admission requirements of ENGR 142, 210, 230 and 260, ENGR 215 is required and recommended to be taken before starting the professional courses.

Professional Courses: 69 credits. The department program begins in the autumn quarter of the junior year. Exceptions are very unusual and must be coordinated with the undergraduate adviser. Junior year professional program courses are all required: A A 300, 301, 302, 310, 311, 312, 321, 322, 330, 331 and 332. The senior year consists of: A A 410-411, 420-421, 450, 460, 498, and 15 credits of senior technical electives. With approval, 3 credits of the latter may be chosen from another area of engineering science. 2 credits of free electives may be needed to meet the 180 credits required for graduation.

Graduate Program

Uy-Loi Ly, Graduate Program Adviser

Wanda Frederick, Graduate Program Coordinator

The Department of Aeronautics and Astronautics offers programs that provide a foundation in the engineering sciences and study in various engineering applications. These lead to the degrees of Master of Science in Aeronautics and Astronautics, Master of Engineering, or Doctor of Philosophy.

Master of Science in Aeronautics and Astronautics

The program of study is tailored to the needs and interests of the student. Each program must be approved by the department graduate committee and must provide breadth through a variety of subjects, depth through extensive study of a specialized field, and analytical strength. Minimum programs consist of either 39 credits of course work, or 30 credits of course work and a 9-credit thesis.

Master of Engineering

The Master of Engineering program is intended to provide course work and research beyond that for the degree of Master of Science in Aeronautics and Astronautics. The student must complete an approved program of study and research, which usually consists of a prior Master of Science degree, followed by a minimum 30 credits of course work and a 9-credit thesis.

Doctor of Philosophy

The doctoral program consists of lectures, seminars, discussions, and independent study, enabling the student to master and to make original contributions to a particular field. In addition to the formal steps for obtaining the degree listed in the Graduate School section of this catalog, the student must complete an approved program of study consisting of 30 credits of course work beyond that required for the Master of Science in Aeronautics and Astronautics, and is expected to be in continuous full-time residence for a minimum of one academic year after advancement to Candidate standing.

Research Activities

Research facilities include the Kirsten 8x12-foot low-speed wind tunnel, a water tunnel, a blow-down tunnel, shock tunnels and Ludwieg tubes, a projectile accelerator, material and structural test machines, a dynamic fracture laboratory, a composite material laboratory, and various fusion-research and engineering physics laboratories. A variety of computer facilities are available, including a computational fluid dynamics laboratory and a new controls laboratory. The Aerospace and Energetics Research Program, which con-

ducts interdisciplinary research in the Aerospace and Energetics Research Building, is also part of the Department of Aeronautics and Astronautics.

Externally funded research is carried out by faculty members and students on such topics as buoyant flows, separation control, combustor mixing, shear layers, computational fluid dynamics, internal flows, reacting flows, ram accelerators, space energy systems, space system design, control system design and engineering, robust and optimal control, wing optimization, impact mechanics, cylinder failure, composite material structure and fracture, plasma science, and fusion research.

Special Facilities/Programs

Aerospace and Energetics Research Program (AERP)

120 Aerospace Research and Engineering Laboratory

The Aerospace and Energetics Research Program is directed toward high-technology engineering research and teaching through research. The program anticipates and tries to outpace the nation's critical technology needs. It therefore emphasizes those engineering skills that both match the requirements of the present and future, and develop in students a broad understanding of the impact of technology on society. Suitable programs are designed to develop the student's imagination and a willingness to respond to the complex and rapidly changing future of engineering. This directs the faculty's efforts and creates within the principal investigators, research faculty, and students the concept of engineering as an adventure.

The program covers many fields, usually centered on energy or aerospace. Currently the program is active in plasma engineering related to fusion power, space energy systems, ram accelerators, advanced gas dynamics research involving new propulsive techniques, cryogenic automobile propulsion, and the use of shock waves to process chemicals.

University of Washington Aeronautical Laboratory (UWAL)

Kirsten Aeronautical Laboratory

The primary facility that UWAL operates is the Kirsten Wind Tunnel, a subsonic, closed circuit, double return tunnel with a 8'x12' test section. Undergraduate students, usually from the Department of Aeronautics and Astronautics, are employed at UWAL to run tests for University research, commercial customers, and for instructional uses, such as student projects. UWAL provides departmental support for research projects such as the Remotely Piloted Vehicle Project (RPV).

Admission

Students who have earned a baccalaureate degree in an accredited program of aeronautics and astronautics or closely related field are eligible for the Master of Science program. Backgrounds in related fields require review on a case-by-case basis, and preparatory courses may be required, depending on the student's previous studies and educational objectives. Admission is competitive, with the equivalent of a 3.00 GPA in previous technical study a minimum standard. Submission of verbal, quantitative, and analytical scores on the Graduate Record Examination is required. Entrance requirement details, application deadlines, application forms, and advising literature may be obtained from the department office.

Admission to the Doctor of Philosophy program is based on satisfactory performance on a departmental qualifying examination. Admission to that examination is based on evidence of superior academic ability.

Additional Information

Students who intend to work toward advanced degrees must apply for admission to the Graduate School. Most students are financially supported by

their employers or by the department as teaching or research assistants. For further information on this or other aspects of department programs, contact the Graduate Program Coordinator, 206 Guggenheim, Box 352400.

Faculty

Chair

Walter H. Christiansen

Professors

Bollard, R. John * 1961; PhD, 1954, Purdue University; mechanics of materials, structural mechanics, aeroelasticity, design and crashworthiness of aircraft.

Bruckner, Adam * 1972; PhD, 1972, Princeton University; space propulsion, power, and systems design; hypersonics, hypervelocity accelerators; lasers.

Christiansen, Walter H. * 1967; PhD, 1961, California Institute of Technology; gas dynamics and gas physics, high-power gas lasers and their application, energy conversion.

Clark, Robert N. * 1957, (Emeritus); PhD, 1969, Stanford University; automatic control systems, fault detection in dynamic systems.

Decher, Reiner * 1967; PhD, 1968, Massachusetts Institute of Technology; aircraft propulsion, fluid mechanics, energy conversion.

Eastman, Fred 1927, (Emeritus); MS, 1929, Massachusetts Institute of Technology; aeronautics and astronautics.

Fyfe, Ian M. * 1959, (Emeritus); PhD, 1957, Stanford University; dynamics, fracture mechanics.

Hertzberg, Abraham * 1966, (Emeritus); MAEE, 1949, Cornell University; high-power lasers, fusion research, solar energy, space systems, energy systems, heat transfer.

Hoffman, Alan Lowell * 1989; PhD, 1967, California Institute of Technology; plasma physics and magnetic confinement fusion.

Holsapple, Keith A. * 1965; PhD, 1965, University of Washington; solid mechanics, continuum mechanics, structure waves, finite element methods.

Jarboe, Thomas R. * 1989; PhD, 1974, University of California (Berkeley); plasma physics and controlled fusion, magnetic reconnection and relaxation.

Kevorkian, Jirair * 1964; PhD, 1961, California Institute of Technology; partial differential equations, perturbation theory.

Kurosaka, Mitsuru * 1987; PhD, 1968, California Institute of Technology; propulsion, turbo machinery, thermo-fluid mechanics, heat transfer and acoustics.

Lin, Kuen-Yuan * 1984; PhD, 1977, Massachusetts Institute of Technology; composite materials, structural mechanics, finite element methods.

Parmeter, R. Reid * 1963; PhD, 1963, California Institute of Technology; structures, solid mechanics, fracture mechanics.

Pearson, Carl E. * 1967, (Emeritus); PhD, 1949, Brown University; wave propagation, fluid dynamics, numerical analysis, optimization.

Russell, David A. * 1967; PhD, 1961, California Institute of Technology; fluid mechanics and gas physics, aerodynamics, shock processes and laser fluid dynamics.

Street, Robert E. 1948, (Emeritus); MA, 1934, PhD, 1939, Harvard University; aeronautics and astronautics.

Vagners, Juris * 1967; PhD, 1967, Stanford University; dynamics, controls and optimization.

Associate Professors

Breidenthal, Robert E. * 1980; PhD, 1979, California Institute of Technology; turbulence, mixing, combustion, vorticity.

Eberhardt, David Scott * 1986; PhD, 1985, Stanford University; computational fluid dynamics, numerical analysis.

Livne, Eli * 1990; PhD, 1990, University of California (Los Angeles); aeroelasticity, aeroservoelasticity, optimization, structural dynamics.

Ly, Uy-Loi * 1988; PhD, 1983, Stanford University; robust controls, parameter optimization, model reduction, digital control, design integration.

Mattick, Arthur T. * 1975; PhD, 1975, Massachusetts Institute of Technology; gas physics, gas lasers, energy conversion.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

A A 300, 301, 302 Aerodynamics I, II, III (4,4,4) *Breidenthal, Decher, Eberhardt* Aerodynamics as applied to the problems of performance of flight vehicles in the atmosphere. Kinematics and dynamics of flow fields; incompressible flow about bodies. Thin airfoil theory; finite wing theory. Compressible fluids; one-dimensional compressible flow; two-dimensional supersonic flow. Viscous flows; boundary layers. Prerequisites: junior standing or permission of instructor for 300; MATH 307 and ENGR 260 for 301; 301 for 302. A A majors only. Offered: A, W, Sp.

A A 310 Orbital and Space Flight Mechanics (3) *Bruckner, Vagners* Newton's law of gravitation. Two-body problem, central force motion, Kepler's laws. Trajectories and conic sections. Position and velocity as functions of time. Orbit determination, coordinate transformations, radar observations. Rocket dynamics, orbital maneuvers, Hohmann transfer. Interplanetary trajectories, patched conics. Planetary escape and capture. Gravity assist maneuvers. A A majors only. Offered: A.

A A 311 Atmospheric Flight Mechanics (4) *Livne, Ly, Russell* Applied Aerodynamics, aircraft flight 'envelope', minimum and maximum speeds, climb and glide performance. Range and endurance, take-off and landing performance, using both jet and propeller power plants. Longitudinal and dynamic stability and control, wing downwash, stabilizer and elevator effectiveness, power effects. Lateral and directional stability and control. A A majors only. Offered: Sp.

A A 312 Structural Vibrations (3) *Bollard, Ly, Parmerter, Vagners* Vibration theory. Characteristics of single and multidegree-of-freedom linear systems with forced inputs. Approximate methods for determining principal frequencies and mode shapes. Application to simple aeroelastic problems. A A majors only. Offered: W.

A A 321, 322 Junior Laboratory II, III (2,2) *Breidenthal, Vagners* The design and conduct of experimental inquiry with consequent introduction to experimental equipment and techniques relative to the general field of mechanics with emphasis in the applied fields of aeronautics and astronautics. A A majors only. Offered: W, Sp.

A A 330, 331, 332 Structural Analysis I, II, III (4,4,4) *Bollard, Holsapple, Livne, Parmerter* Analysis and design of aerospace structures. Stress, deformation, strain, and displacement. Development of the equations of elasticity. Applications to aerospace structural elements, including beams, torsion, plane stress and strain, thin walled structures, plates, buckling; energy principles: introduction to finite element analysis. Fa-

cture, yielding, and fracture. Prerequisite: 330 for 331, 331 for 332. A A majors only. Offered: A, W, Sp.

A A 370 Introduction to Applied Analysis (3) Analytical and numerical methods for Aerospace engineering. Function analysis, linearization, and approximation. Vector analysis, line, surface, and volume integrals. Linear algebra, eigensystems. Computer methods, iteration, nonlinear equations, matrices. Prerequisite: MATH 307. A A majors only. Offered: A.

A A 400 Gas Dynamics (3) *Christiansen, Eberhardt, Russell* Introduction to kinetic theory and free molecule flows. Review of thermodynamics. One-dimensional gas dynamics: one-dimensional wave motion, waves in supersonic flow, flow in ducts and wind tunnels. Prerequisite: ENGR 260 or permission of instructor. Offered: W.

A A 402 Fluid Mechanics (3) *Christiansen, Russell* Inviscid equations of motion, incompressible potential flows, small perturbation flows, bodies of revolution, viscous equations, exact solutions, laminar boundary-layer equations, similar solutions, integral methods. Compressibility, instability, turbulent boundary layers. Prerequisites: 302 and ENGR 260 or permission of instructor. Offered: Sp.

A A 405 Space and Plasmas (3) NW Survey of various phenomena occurring in outer regions of Earth's atmosphere, ionosphere, magnetosphere, and Van Allen radiation belts. Laboratory applications include plasma thrusters and fusion. Concepts include charged particles in magnetic fields, drift motion, plasma, magnetohydrodynamic waves. Prerequisite: PHYS 321 or equivalent or permission of instructor. Offered: jointly with GPHYS 405; W.

A A 410- Aircraft Design I (4) Conceptual design of a modern airplane to satisfy a given set of requirements. Estimation of size, selection of configuration, weight and balance, and performance. Satisfaction of stability, control, and handling qualities requirements. Prerequisite: 302; recommended: 440. Offered: W.

A A 411 Aircraft Design II (4) *Livne* Preliminary design of a modern airplane to satisfy a given set of requirements. Estimation of size, selection of configuration, weight and balance, and performance. Satisfaction of stability, control, and handling qualities requirements. Prerequisite: 410. Offered: Sp.

A A 419 Aerospace Heat Transfer (3) *Bruckner, Jarboe, Mattick* Fundamentals of conductive, convective, and radiative heat transfer with emphasis on applications to atmospheric space flight. Prerequisite: senior standing in aeronautics and astronautics. Offered: A.

A A 420- Spacecraft and Space Systems Design I (4-) *Bruckner* Design of space systems and spacecraft for advanced near-Earth and interplanetary missions. Astrodynamics, space environment, space systems engineering. Mission design and analysis, space vehicle propulsion, flight mechanics, atmospheric entry, aerobraking, configuration, structural design, power systems, thermal management, systems integration. Design topics vary. Prerequisite: 310 or permission of instructor. Recommended: 419. Offered: W.

A A 421 Spacecraft and Space System Design II (4-) *Bruckner* A continuation of 420. Course content varies from year to year and is dependent on the design topic chosen for 420. Prerequisite: 420. Offered: Sp.

A A 430 Finite Element Structural Analysis (3) *Holsapple, Lin, Parmerter* Introduction to the finite element method and application. One- and two-dimensional problems including trusses, beams, box beams, plane stress and plane strain analysis, and heat transfer. Use of finite element software. Prerequisite: 332 or equivalent. Offered: A.

A A 432 Composite Materials for Aerospace Structures (3) *Lin* Introduction to analysis and de-

sign of aerospace structures utilizing filamentary composite materials. Basic elastic properties and constitutive relations of composite laminates. Failure criteria, buckling analysis, durability, and damage tolerance of composite structures. Aerospace structure design philosophy and practices. Prerequisite: 332 or permission of instructor. Offered: W.

A A 441 Flight Mechanics (3) *Eberhardt, Livne* Determination in flight of performance, stability, and control characteristics; and comparison with predicted and wind tunnel results. Prerequisites: 311, senior standing, A A major. Offered: Sp.

A A 448 Control Systems Sensors and Actuators (3) Study of components and formulation of their mathematical models. Amplifiers, servomotors, synchros, gyroscopes. Accelerometers, reaction mass actuators, potentiometers, shaft encoders and resolvers, proximity sensors, force and torque transducers. Experimental determination of component models and model parameters. Two 3-hour laboratories per week. Prerequisite: senior standing. Offered: jointly with E E 448; W.

A A 449 Design of Automatic Control Systems (4) Design problems in electromechanical feedback systems, aerospace and hydrospace vehicles, systems with unstable plants, lightly damped modes, nonminimum phase plants, nonlinear plants. Computer-aided simulation and design emphasized. Team effort encouraged. Design reviews, oral presentations required. Prerequisite: 450 or E E 446 or M E 471 or equivalent. Offered: jointly with E E 449; Sp.

A A 450 Control in Aerospace Systems (4) *Ly, Vagners* Overview of feedback control. Linearization of nonlinear models. Model properties: stability, controllability, observability. Dynamic response: time and frequency domain techniques. Frequency response design techniques. Design of aerospace control systems via case studies. Prerequisites: MATH 307 and ENGR 230. Recommended: 311 and 312. Offered: A.

A A 460 Propulsion I (3) *Breidenthal, Bruckner, Decher, Kurosaka* Study of the aero- and thermodynamics of rocket engines. Rocket vehicle performance. Introduction to space propulsion. Air-breathing engines as propulsion systems. Turbojets, turbopumps, turboprops, ramjets, hybrid engines. Aerodynamics of gas-turbine engine components. Prerequisites: 302 and ENGR 260. Offered: A.

A A 461 Propulsion II (3) *Bruckner, Decher, Kurosaka* Physical characteristics and components of rockets. Nozzle gasdynamics and non-ideal flow effects. Solid and liquid propulsion systems, components, and design. Electric propulsion fundamentals and applications. Aerodynamics of airbreathing engine components: inlets, compressors, turbines, afterburners, nozzles. Engine design methodology. Prerequisite: 460 or permission of instructor. Offered: W.

A A 480 Systems Dynamics (3) *Bollard, Parmerter* Equations of motion and solutions for selected problems; natural frequencies and mode shapes; response of simple systems to applied loads. Prerequisite: senior standing. Offered: Sp.

A A 498 Special Topics in Aeronautics and Astronautics (0-1) Lectures and discussions on topics of current interest in aviation and space engineering. Three quarters required for credit. Offered: AWSp.

A A 499 Special Projects (2-5; max. 10) Investigation on a special project by the student under the supervision of a faculty member. A maximum of 6 credits may be applied toward senior technical electives. Prerequisite: senior standing or permission of instructor. Offered: AWSp.

Courses for Graduates Only

A A 501 Physical Gasdynamics I (3) *Christiansen, Mattick* Equilibrium kinetic theory; chemical thermodynamics; thermodynamic properties derived from

quantum statistical mechanics; reacting gas mixtures; applications to real gas flows and gas dynamics. Offered: odd years; A.

A A 502 Physical Gasdynamics II (3) *Christiansen, Mattick* Introduction to vibrational relaxation and nonequilibrium chemistry. Nonequilibrium physics applied to flow. Brief introduction to nonequilibrium kinetic theory. Application to a variety of research and development areas such as high-temperature energy systems and gas lasers. Prerequisite: 501 or permission of instructor. Offered: even years; W.

A A 503 Kinetic Theory/Radiative Transfer (3) *Christiansen, Hoffman, Jarboe* Boltzmann and Collisionless Boltzmann (Vlasov) equations. Instabilities in homogeneous and inhomogeneous plasma, quasi-linear diffusion, wave-particle interaction, collisional (Fokker-Planck) equation. Introduction to radiative non-equilibrium, scattering and absorption processes. Integral equation of radiative transfer. Prerequisites: 501 or permission of instructor. Offered: even years; Sp.

A A 504 Fluid Mechanics (3) *Kurosaka, Russell* Review of thermodynamics; vectors and dyads. Derivation of the Navier-Stokes equations, stream functions and potential functions; integrals of the equations of motion. Boundary conditions and discontinuity surfaces in fluids. Exact solutions. Dimensional analysis. Vorticity dynamics. Highly viscous flows. Rotational flows. Offered: A.

A A 505 Fluid Mechanics of Inviscid Flow I (3) *Christiansen, Decher, Kurosaka, Russell* Ideal incompressible flow; potential and stream functions. Airfoil theory and lifting line theory. Introduction to nonsteady flow; sound waves and surface waves; special topics. Offered: even years; W.

A A 506 Fluid Mechanics of Inviscid Flow II (3) *Breidenthal, Decher, Kurosaka, Russell* Ideal compressible flow; supersonic airfoils; shock waves; slender-body theory; lifting surface theory; approximate methods. Transonic flow; similarity; special topics. Prerequisite: 505. Offered: even years; Sp.

A A 507 Aerodynamics of Viscous Fluids I (3) *Kurosaka, Russell* Introduction to viscous flow; exact solutions of the laminar equations of motion; approximate equations. Exact solutions for laminar boundary-layer equations. Approximate methods for compressible laminar boundary layers. Offered: odd years; W.

A A 508 Aerodynamics of Viscous Fluids II (3) *Breidenthal, Kurosaka, Russell* The phenomena of turbulence; transition prediction; Reynolds stresses; turbulent boundary-layer equations. Approximate methods for turbulent boundary layers. Prerequisite: 507 or permission of instructor. Offered: odd years; Sp.

A A 509 Computational Fluid Dynamics I (3) *Eberhardt* Numerical approximation of the inviscid compressible equations of fluid dynamics. Analysis of numerical accuracy, stability, and efficiency. Use of explicit, implicit, and flux split methods. Discussion of splitting, approximate factorization, discrete point, and finite volume approaches. Applications to the solution of simple hyperbolic systems of equations and the Euler equations. Offered: W.

A A 510 Computational Fluid Dynamics II (3) *Eberhardt* Numerical approximation of equations of compressible viscous flow. Mesh requirements for resolving viscous effects in high Reynolds number flows. Analysis of numerical accuracy, stability, and efficiency. Use of explicit and implicit methods, boundary condition procedures. Applications to solution of the Navier-Stokes equations. Prerequisite: 509 or permission of instructor. Offered: odd years; Sp.

A A 513 Gas Laser Theory and Practice (3) *Christiansen, Mattick* Physics and fluid mechanics of gas lasers, with emphasis on performance of gas dynamic lasers, flowing chemical lasers, and gaseous electric lasers. Development of laser optics, interaction

of radiation and matter, laser oscillation conditions, and methods of obtaining population inversions. Applications of high-power lasers emphasized. Offered: even years; Sp.

A A 516 Stability and Control of Flight Vehicles I (3) *Ly* Static and dynamic stability and control of flight vehicles in the atmosphere. Aerodynamics for stability derivatives. Response to control inputs and external disturbances. Effect of stability derivatives on flight characteristics. Handling qualities. Introduction to automatic control. Offered: A.

A A 517 Stability and Control of Flight Vehicles II (3) *Ly, Vagners* Specification of flight vehicle performance objectives. Control system components, sensor characteristics, choice of system models. Compensator design, frequency domain design of stability augmentation systems, single/multiple loop autopilot design and evaluation. Use of computer-aided control design packages. Prerequisite: 516. Offered: W.

A A 518 Stability and Control of Flight Vehicles III (3) *Ly, Vagners* Introduction to Linear-Quadratic-Gaussian (LQG) optimal control theory. Synthesis of stability augmentation systems and autopilot control laws using LQG methodology. Relationship of LQG results to frequency domain criteria. Reduced-order controller synthesis, digital design and implementation. Use of computer-aided control design packages. Prerequisite: 517. Offered: Sp.

A A 520-521-522 Seminar (0-0-1) Topics of current interest in aerospace engineering. Offered: A-W-Sp.

A A 523 Special Topics In Fluid Physics (3) Offered: AWSp.

A A 524 Aircraft Engine Noise (3) *Kurosaka* Description and measurement of noise, power spectra. Elementary duct acoustics, rotor-stator interaction, effect of design blade loading. Turbine noise, core noise, acoustic linings. Jet noise, Lighthill theory, scaling laws. Offered: odd years; A.

A A 525 Aerothermodynamics of Aircraft Engines Components (3) *Decher, Kurosaka* Estimation of component performances. Inlets and exhausts. Aerodynamics of turbines and compressors. Radial equilibrium theory, through-flow theory. Inlets and exhausts. Offered: even years; W.

A A 526 Aerothermodynamics of Aircraft Engine Systems (3) *Decher, Kurosaka* Aircraft gas turbine engine, cycle analysis. Component performance measures. Preliminary design of engines, including component losses. Off-design performance. Variable geometry engines. Offered: even years; Sp.

A A 527 Energy/Conversion I (3) *Decher* Energy resources. Heat generation by combustion, solar collection. Analysis of power systems for space and advanced commercial power generation. High-temperature cycles. Offered: even years; A.

A A 528 Energy/Conversion II (3) *Decher* Heat exchangers, energy storage. Direct conversion of heat to electricity. Electrochemical processes. Recommended: 527. Offered: odd years; W.

A A 529 Space Propulsion (3) *Decher* Nuclear, and heat transfer of nuclear-heated rockets. Electrothermal, electromagnetic, and electrostatic thrusters. Power/propulsion systems. Prerequisite: permission. Offered: odd years; Sp.

A A 530 Mechanics of Solids (3) *Bollard, Holsapple, Lin, Livne* General concepts and theory of solid mechanics. Large deformations. Behavior of elastic, viscoelastic, and plastic solids. Linear theory of elasticity and thermoelasticity. Wave propagation in solids. Offered: A.

A A 531 Structural Reliability and Damage (3) *Bollard, Parmeter* Theory of plasticity, yield sur-

faces, flow rules, limit theorems. Concepts of failure and fatigue in aerospace structures, residual strength, cumulative damage, probability aspects and case histories. Prerequisite: 530 or equivalent or permission of instructor. Offered: odd years; W.

A A 532 Mechanics of Composite Materials (3) *Lin* Analyses and design of composite materials for aerospace structures. Micromechanics. Anisotropic elasticity. Laminated plate theory. Thermo-viscoelastic behavior and fracture of composites. Prerequisite: 530 or permission of instructor. Offered: odd years; Sp.

A A 535 Analysis of Shells I (3) *Parmeter* General development of the geometrically non-linear theory of thin elastic shells. Topics include an introduction to tensor analysis with applications to curved two dimensional spaces, theory of surfaces, Kirchhoff approximations, membrane theory and non-linear shallow shells. Offered: even years; Sp.

A A 540 Finite Element Analysis I (3) *Holsapple, Lin* Formulation of the finite element method using variational and weighted residual methods. Element types and interpolation functions. Application to elasticity problems, thermal conduction, and other problems of engineering and physics. Offered: W.

A A 541 Finite Element Analysis II (3) *Holsapple, Lin* Advanced concepts of the finite element method. Hybrid and boundary element methods. Nonlinear, eigenvalue, and time-dependent problems. Prerequisite: 540 or permission of instructor. Offered: Sp.

A A 546 Mathematical Foundations of Systems Theory (4) Mathematical foundations for system theory presented from an engineering viewpoint. Includes set theory; functions, inverse functions; metric spaces; finite dimensional linear spaces; linear operators on finite dimensional spaces; projections on Hilbert spaces. Applications to engineering systems stressed. Prerequisite: graduate standing or permission of instructor. Offered: jointly with CHEM E E/E M E 510; A.

A A 548 Linear Multivariable Control (3) *Ly, Vagners* Single loop feedback control theory; poles, zeros, Nyquist stability, performance, robustness of multivariable systems; multivariable control synthesis: Linear-Quadratic-Gaussian methods, loop transfer recovery, Youla parameterization, H-infinity techniques, parameter optimization design. Prerequisite: E E 584 or M E 575; E E 446 or A A 448 or M E 471 or equivalent. Offered: jointly with E E/M E 548; W.

A A 549 Estimation and System Identification (3) *Vagners* Review of system models, model structure, model parameterization; review of stochastic processes; state estimation: observers, the Kalman-Bucy filter, numerical issues in filter design and implementation; system identification: linear regression, least squares, maximum likelihood, instrumental variable techniques. Prerequisites: E E 505 or AMATH 506 or STAT 506; recommended: 548 or E E 548. Offered: jointly with E E/M E 549; Sp.

A A 550 Nonlinear Optimal Control (3) *Vagners* Calculus of variations for dynamical systems, definition of the dynamic optimization problem, constraints and Lagrange multipliers, the Pontryagin Maximum Principle, necessary conditions for optimality, the Hamilton-Jacobi-Bellman equation, singular arc problems, computational techniques for solution of the necessary conditions. Prerequisite: graduate standing; recommended: A A 548 or E E 548. Offered: jointly with E E/M E 550; odd years.

A A 553 Vibrations of Aerospace Systems (3) *Bollard, Livne* Continuous and discrete systems, natural frequencies, and modal analysis; forced vibrations and motion-dependent forces. Structural damping; control augmented structures. Measurements for structural dynamic testing. Prerequisite: 571 or equivalent. Offered: odd years; Sp.

A A 554 Aeroelasticity (3) *Livne* Static and dynamic aeroelasticity, unsteady aerodynamics, aero-servoelastic modeling, and active control. Offered: even years; Sp.

A A 556 Space and Laboratory Plasma Physics (3) *Jarboe* Discussion of waves, equilibrium and stability, diffusion and resistivity, basic plasma kinetic theory, and wave-particle interactions. Prerequisite: A A 405 or equivalent or permission of instructor. Offered: jointly with GPHYS 537; Sp.

A A 557 Plasma Theory II (3) *Hoffman, Jarboe* Equilibrium, stability, and confinement. Classical transport, collisionless and resistive skin depths. Ideal MHD equations formally derived and properties of plasmas in the ideal limit are studied. Straight and toroidal equilibrium. Linear stability analysis with examples. Taylor minimum energy principle. Prerequisite: 556. Offered: even years; W.

A A 558 Plasma Science Seminar (1) *Hoffman, Jarboe, Shumlak* Current topics in plasma science and controlled fusion with presentations by invited speakers, on-campus speakers, and students. Students expected to give a seminar once or twice a year with instructor review the method of presentation and material used for the presentation. Offered: AWSpS.

A A 565 Fusion Reactor Fundamentals (3) *Jarboe* Introduction to basic engineering features of fusion power plants. Brief description of basic fusion physics and discussion of power plants for leading thermonuclear concepts. Engineering problems; blanket, shield neutronics; materials, thermal hydraulics; tritium, superconducting systems. Prerequisite: completion of or concurrent enrollment in 556 or permission of instructor. Offered: odd years; W.

A A 567 Analysis in Engineering and Science I (3) Complex variable and associated topics. Branch cuts, series and product expansions. Contour integration, numerical implications. Harmonic functions. Complex potential (and singularities) in physical problems. Conformal mapping; applications and examples. Fourier and Laplace transforms and applications. Recommended: AMATH 401 or equivalent. Offered: jointly with AMATH 567; A.

A A 568 Analysis in Engineering and Science II (3) Survey of practical solution techniques for ordinary differential equations. Linear systems of equations including nondiagonalizable case. Linear difference equations. Nonlinear systems; stability phase plane analysis. Poincaré maps. Asymptotic expansions. Regular and singular perturbations. Some computer work may be assigned. Prerequisite: AMATH 402 or equivalent. Offered: jointly with AMATH 568; W.

A A 569 Partial Differential Equations (3) Analytical solution techniques for linear partial differential equations, discussion of how these arise in engineering and science. Transform and Green's function methods. Classification of second-order equations, theory, and applications of method of characteristics. Prerequisite: AMATH 403, 568 or MATH 428 or permission of instructor. Offered: jointly with MATH/AMATH 569; Sp.

A A 571 Principles of Dynamics I (3) *Livne, Ly, Vagners* Systems of particles, rotating axes, rigid-body dynamics; calculus of variations. Lagrangian mechanics. Hamilton's principle. Kane's equations. Periodic and quasiperiodic motion. Stability of dynamical systems. Offered: A.

A A 575 Continuum Mechanics I (3) *Holsapple, Pamenter* General foundations of the fundamental concepts of motion, stress, energy, and electromagnetism for a continuum. General equations of conservation of mass, momentum, and energy. Linear and nonlinear elastic, viscous, and inelastic materials. Offered: jointly with CISM 521; even years; W.

A A 583 Special Topics in Solid Mechanics (3) Offered: AWSpS.

A A 584 Applied Linear Algebra and Introductory Numerical Methods (3) *Vagners* Applied linear algebra: matrix operations, linear systems, matrix factorization, eigenvalues, numerical methods, applications to optimization, circuits, differential equations. Surveys of numerical methods: nonlinear systems, curve fitting, ordinary differential equations, quadrature, basic ideas in partial differential equations. Offered: jointly with AMATH 584; A.

A A 585, 586 Approximate Numerical Analysis II, III (3,3) Advanced topics in numerical analysis. More detailed consideration of topics in 584. Emphasis on methods for partial differential equations, integral equations, finite elements, stability and accuracy, mesh generation, adaptive meshes, sparse matrices, variational methods. Postmaster's sequence. Prerequisites: 567, 584, and 588, 569, or equivalent. Offered: jointly with AMATH 585, 586; even years; W, Sp.

A A 590 Special Topics in Applied Analysis (3) Offered: AWSpS.

A A 591 Robotics and Control Systems Colloquium (1, max. 3) Colloquium on current topics in robotics and control systems analysis and design. Topics presented by invited speakers as well as on-campus speakers. Emphasis on the cross-disciplinary nature of robotics and control systems. Offered: jointly with CHEM E/E E 591; AWSpS.

A A 599 Special Projects (1-5, max. 15) Investigation on a special project by the student under the supervision of a faculty member. Offered: AWSpS.

A A 600 Independent Study or Research (*) Offered: AWSpS.

A A 700 Master's Thesis (*) Offered: AWSpS.

A A 800 Doctoral Dissertation (*) Offered: AWSpS.

Bioengineering

309 Harris Hydraulics Laboratory

The Center for Bioengineering provides a multidisciplinary program of collaborative research and training designed to accelerate the application of new engineering technologies to clinical practice and research. Major areas of current bioengineering research include bioinstrumentation, biomaterials, biomechanics, controlled drug-release systems, imaging, microsensors, bioelectromagnetics, molecular bioengineering, microcirculation, cellular bioengineering, muscle, and simulation of biosystems. There are options for study leading to master's and doctoral degrees with different levels of specialization. Detailed information on Bioengineering, its faculty and courses appears in the Interchool or Intercollege Programs section of this catalog.

Chemical Engineering

105 Benson

Chemical engineering is concerned with processes for transforming raw materials into energy and into a great variety of consumer products, such as gasoline, pulp and paper, fertilizers, rubber, polymers and composites, pharmaceuticals, and electronic materials. Chemical engineers work on research and development of these materials and on the processes for making them, as well as on the design and operation of chemical plants and equipment by which production is achieved. This must be done with efficiency, economy, and concern for society and the environment. Some chemical engineers are employed by government agencies. Few other professions can match the diver-

sity of job opportunities available to graduates in chemical engineering.

Chemical engineers employ the skills of mathematics, physics, chemistry, and, increasingly, biology. The chemical engineer develops competence in the use of fundamental tools for engineering analysis and design: thermodynamics, chemical kinetics and reactor design, fluid mechanics, heat and mass transfer, process control, and economics. At the University, the student studies intensively in these fields to acquire knowledge and skills applicable in a variety of specialized fields and industries. Flexibility, in fact, is the hallmark of the chemical engineer. Graduates of the department are given thorough grounding in the three main pillars of a liberal education—science, technology, and the humanities and social sciences.

Undergraduate Program

Bachelor of Science in Chemical Engineering

The Bachelor of Science in Chemical Engineering degree offered by the department is an accredited, professional program. Its completion should enable the graduate either to find employment in industry or to continue on to graduate school.

Information on degree requirements is available in detail from the department. In brief, the required 180 credits includes the College of Engineering General Education requirements as specified above; engineering electives, 16; chemical engineering, 45; and electives, 7. Many engineers design new equipment and processes or design modifications to them. The design experience is integrated throughout the curriculum, with open-ended problems (sometimes involving economic constraints) in several courses: design of heat exchangers (CHEM E 340) and distillation towers (CHEM E 435), design by piping and pumping systems (CHEM E 330), design of packed bed and fluidized bed reactors (CHEM E 465). The design experience culminates in two capstone design courses (CHEM E 485 and 486) which involve the design of a chemical plant. An optional 9-credit specialty area allows each student to develop special competence in a selected subject by taking a minimum of three courses in that area. Engineering and free electives may be used for this purpose. The areas are biotechnology; polymers, composites, colloids, and interfaces; computers applied to chemical engineering; electronic materials; and environmental engineering. A minimum GPA of 2.00 in chemical engineering courses, based on the first time each course is taken, is required for graduation.

Students can participate in the Cooperative Education Program of the College.

Advising in the Department

All students, including freshmen and sophomores, who are considering chemical engineering as a major are encouraged to be advised in the department.

Admission Requirements

Admission to the department is limited, and application requirements are subject to change. Students should consult an adviser about current requirements. Applications from women and minorities are encouraged. The applicant must have completed at least 12 credits at the UW and the following courses: MATH 124, 125, 126, 307 (18 credits); CHEM 140, 141, 150, 160, 223 or 237 (18); PHYS 121/131, 122/132 (10), CSE/ENGR 142, ENGR 260 (8); and one 5-credit English composition course. In addition, it is strongly recommended that students complete PHYS 123/133 and CHEM 224 or 238. Students with a GPA lower than 2.50 for these specified courses or an overall GPA lower than 2.50 for all courses applicable to the B.S.Ch.E. degree seldom succeed in the department. Historically, a minimum GPA of 2.80 in these categories is required for admission to and success in the department. Admission is on

a space-available or competitive basis. Students who wish to be admitted but who have not yet completed 12 credits at the UW should consult an adviser in the department.

Factors included in the admissions decision include the course record as indicated above and qualitative considerations such as difficulty of completed courses, frequency of incomplete or withdrawal grades, number of repeated courses, applicable work experience and maturity of attitude, record of honors, and a demonstrated ability to take at least 12 credits per quarter.

Application Procedure and Timing

Application is made by filling out an application form available in the department office. Students may apply for admission for spring and autumn quarters, and are invited to consult with the departmental adviser.

Admission for the Disadvantaged

While the sole purpose of the admission requirement is to limit enrollment to a number that can be taught well with the resources available, the department recognizes that this may eliminate some disadvantaged students whose potential is high but who, through extenuating circumstances of their background, have had limited access to early education that provides adequate experience in abstract reasoning. For purposes of special consideration for admission, a disadvantaged student is here defined as one who (1) is economically disadvantaged as shown by eligibility for a Basic Need Grant on the National Financial Aid Program, or (2) is educationally disadvantaged, having attended a school without a full and available complement of college preparatory courses, or (3) has ethnic minority status with a group showing historic underrepresentation in the field of engineering. These students are encouraged to apply for admission and to attach to their application a letter to the admissions committee that provides information on the applicant that is relevant to the admission decision.

Entrance to Chemical Engineering Courses

Entrance into most chemical engineering courses is ordinarily limited to majors in chemical engineering, pulp and paper technology, and the B.S.E. program. Other students who wish to take departmental courses must meet the admission requirements of the department, have the course prerequisites, and fill out a chemical engineering course request form.

Continuation Policy

The department policy on continuation is consistent with the continuation policy of the College. Details may be obtained from the department.

Graduate Program

The department offers studies leading to the degrees of Doctor of Philosophy, Master of Science in Chemical Engineering, and Master of Science in Engineering. The doctoral degree is centered on the dissertation with a foundation in course work; it is generally completed in four to five years beyond the baccalaureate degree.

In the master's program primary emphasis is placed on course work, and the degree generally requires 24 months of study. Thesis and nonthesis options are available, with the former requiring both course work and research.

The program of study normally includes basic subjects of importance to all chemical engineers, such as thermodynamics, transport phenomena, kinetics, and applied mathematics. In addition, students are invited to take more specialized courses in chemical engineering or in other departments. Students usually take four

courses during their first quarter. Subsequently, less time is spent on course work and more on research.

The department has about 60 full-time graduate students, roughly one-fourth of whom are working toward the M.S. degree and three-fourths toward the doctorate. They study and collaborate with members of the faculty in an atmosphere that is informal, friendly, and intellectually vigorous. The range of interests among the faculty members is quite broad, so students in courses and in research work have access to a variety of fields while receiving individual attention and guidance.

Research Facilities

The department is fortunate in having outstanding facilities. The chemical engineering building, Benson Hall, is supplied with much new research equipment. The building contains classrooms, offices, stockrooms, a well-staffed machine shop, laboratories, and a variety of specialized research equipment, including many microcomputers. Each graduate student is provided desk space in a small laboratory or office as well as access to larger laboratories in the building. Students also may use the services of the Academic Computer Center, the glassblowing shop, and the Chemistry-Chemical Engineering Library.

Admission Requirements

A student is accepted for admission to the Graduate School as a chemical engineering major by joint action of the Graduate School and the department after consideration of a formal application. Most students applying for admission as graduate students have a Bachelor of Science degree in chemical engineering. If a student has an undergraduate degree in chemistry, physics, mathematics, or another branch of engineering, he or she may obtain a graduate degree in chemical engineering by meeting certain additional requirements.

The Graduate Record Examination (GRE), not including the advanced test, is generally required of all applicants. In addition, applicants who do not have a baccalaureate degree in chemical engineering from an accredited university in the United States must take the advanced test in chemistry or engineering.

Financial Aid

The department has various sources of support for qualified graduate students. Prospective students interested in applying for admission and support should request application forms from the department. The completed forms and reference letters should be received in the department office by January 15, if possible, and by February 15 at the latest. Offers of admission with financial support are usually made in February and March.

Correspondence and Information

Graduate Program Coordinator
Department of Chemical Engineering, Box 351750

Faculty

Chair

Bruce A. Finlayson

Professors

Allan, G. Graham * 1966; PhD, 1956, University of Glasgow (UK); DSc, 1971, University of Strathclyde (UK); fiber and polymer science, creativity and innovation.

Babb, Albert L. * 1956, (Emeritus); MS, 1949, PhD, 1951, University of Illinois; nuclear reactor engineering, bioengineering.

Berg, John C. * 1964; PhD, 1964, University of California (Berkeley); interfacial phenomena, surface and colloid science.

Bowen, J. Ray * 1981; PhD, 1963, University of California (Berkeley); combustion.

Davis, E. James * 1983; PhD, 1960, University of Washington; transport in porous media, microparticle physics and chemistry, surface and colloid science.

Finlayson, Bruce A. * 1967; PhD, 1965, University of Minnesota; modeling of chemical reactors, polymer flow, flow through porous media.

Garlid, Kermit L. * 1960, (Emeritus); PhD, 1961, University of Minnesota; nuclear fuel cycles, radioactive waste management.

Heideger, William J. * 1957, (Emeritus); PhD, 1959, Princeton University; biomedical transport phenomena.

Hoffman, Allan S. * 1970; DSc, 1957, Massachusetts Institute of Technology; polymer materials science and engineering.

Horbett, Thomas A. * 1973; PhD, 1970, University of Washington; interfacial proteins, cell interactions, insulin delivery systems.

Lidstrom, Mary E. 1995; MS, 1975, PhD, 1977, University of Wisconsin; environmental biotechnology, molecular bioengineering.

McKean, William T. * 1979; PhD, 1968, University of Washington; pulp and paper science, chemical engineering.

Pilat, Michael J. * 1967, (Adjunct); PhD, 1967, University of Washington; air resources engineering (design of air-pollution-control equipment).

Ratner, Buddy D. * 1972; PhD, 1972, Polytechnic Institute of Brooklyn; synthesis and characterization of polymeric biomaterials.

Ricker, Neil L. * 1978; PhD, 1978, University of California (Berkeley); chemical process design, simulation, and control.

Rogers, James W. Jr. * 1990; PhD, 1979, University of Texas (Austin); surface chemistry and engineering, applications to thin film deposition.

Seferis, James C. * 1977; PhD, 1977, University of Delaware; polymer science and engineering, polymeric composites.

Stuve, Eric M. * 1985; PhD, 1983, Stanford University; catalytic and electrochemical surface science.

Woodruff, Gene L. * 1975; PhD, 1965, Massachusetts Institute of Technology; reactor physics, fusion engineering, neutron spectroscopy, energy studies.

Yager, Paul * 1987, (Adjunct); PhD, 1980, University of Oregon; physical chemistry and applications of biomembranes.

Associate Professors

Castner, David G. * 1986, (Research); PhD, 1979, University of California (Berkeley); surface analysis characterization of biomedical and catalytic materials.

Gustafson, Richard Roy * 1986, (Adjunct); PhD, 1982, University of Washington; process modeling and optimization, fiber composites.

Hodgson, Kevin T. * 1991, (Adjunct); PhD, 1986, University of Washington; surface and colloid science, papermaking chemistry, secondary fiber recycling.

Holt, Bradley R. * 1984; PhD, 1984, University of Wisconsin; process control, process design.

Krieger-Brockett, Barbara * 1976; PhD, 1976, Wayne State University; reaction engineering, chemical kinetics and catalysis simulation.

Assistant Professors

Baneyx, Francois * 1992; PhD, 1991, University of Texas (Austin); biotechnology, protein technology, biochemical engineering.

Chang, Michael Wei * 1992, (Adjunct); MD, 1988, University of Texas (Galveston); physical medicine and rehabilitation, electrophysiology biomechanics.

Schwartz, Daniel T. * 1991; PhD, 1989, University of California (Davis); electrochemical engineering and electrolytic thin film science.

Wedgewood, Lewis E. * 1990; PhD, 1988, University of Wisconsin; computational fluid mechanics, macromolecular fluid flow, transport phenomena, stochastic simulation.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

CHEM E 260 Thermodynamics (4) Introduction to the basic principles of thermodynamics from a macroscopic point of view. Emphasis on the First and Second Laws and the State Principle, problem solving methodology. Prerequisites: MATH 126, PHYS 121, and CHEM 140. Offered: W.

CHEM E 309 Creativity and Innovation (2) VLPA Allan Understanding creativity and creative thinking; its challenges and dynamics through knowledge, judgment, planning, and observation. Techniques of creative thinking. Design and development of creative games. Computer-aided creative thinking. Creation, protection, and exploitation of a useful idea, including bargaining and negotiations. Prerequisite: junior standing or permission of instructor. Offered: jointly with PSE 309; Sp.

CHEM E 310 Material and Energy Balances (4) Chemical and physical process calculations: steady- and unsteady-state material and energy balances with specific examples in vapor-liquid contact operations and multiphase extraction; and introductory thermochemistry. Prerequisite: ENGR 260. Offered: ASP.

CHEM E 326 Chemical Engineering Thermodynamics (4) Phase equilibria and chemical equilibria in multicomponent systems; theories of solution; chemical reaction analysis. Prerequisites: 310; CHEM 456 or ENGR 260. Offered: AW.

CHEM E 330 Transport Processes I (4) Diffusive transport of momentum, heat and mass; general aspects of fluid flow; the Navier-Stokes equations; one-dimensional flow with engineering applications. Prerequisites: 310 and MATH 307. Offered: AW.

CHEM E 340 Transport Processes II (4) Heat transfer, basic principles, and applications. Conduction, convection, and radiation. Prerequisite: 330. Offered: WSp.

CHEM E 400 Methods of Engineering Analysis (3) NW Applications of mathematics to problems in chemical engineering; vector calculus; properties and methods of solution of first and second order partial differential equations; similarity transforms, separation of variables, Laplace and Fourier transforms. Prerequisites: MATH 205, MATH 307, MATH 328, or permission of instructor. Offered: jointly with AMATH 400; A.

CHEM E 435 Transport Processes III (4) Mass transfer, basic principles, and applications to equipment design. Physical separation processes. Prerequisites: 326, 340. Offered: ASP.

CHEM E 436 Chemical Engineering Laboratory I (3) Lectures on experimental design, instrumentation, laboratory safety, and report writing; laboratory experiments on fluid mechanics and heat transfer. Emphasis on experimental planning, procedures, and

report writing. Prerequisites: 326, 340, and ENGR 231. Offered: AWSp.

CHEM E 437 Chemical Engineering Laboratory II (3) Continuation of 436. Laboratory investigation of chemical engineering principles applied to equipment design with emphasis on mass transfer operations and chemical reactors. Prerequisites: 435, 436, 465. Offered: AW.

CHEM E 450 Solid State Materials and Chemical Processes (3) Seferis Fundamentals of solid state including process analysis, mechanical properties; heterogeneity; anisotropy; liquid/solid transformations; rate processes; thermal analysis; viscoelasticity; microscopy; molecular characterization techniques. Application of fundamentals in examining polymers, metals and ceramics as used in the electronics and aviation industries. Prerequisites: 330, 340, and 465, or permission of instructor. Offered: W.

CHEM E 455 Surface and Colloid Science Laboratory (1/3) Berg Laboratory techniques, equipment, and underlying fundamentals in surface and colloid science. Experiments in the measurement of surface tension, adsorption, wetting and spreading, colloid properties, emulsion preparation and stability, electrophoresis, and interfacial hydrodynamics. Prerequisites: 326, 330, CHEM 461. Offered: Sp.

CHEM E 458 Surface Analysis (3) Understanding of solid surfaces for research and development in microelectronics, catalysis, adhesion, biomaterials science, wear, and corrosion science. Newer methods available to study surfaces of materials. Electron emission spectroscopies (ESCA, Auger); ion scattering, ion spectroscopic, photon spectroscopic, and thermodynamic methods. Offered: jointly with BIOEN 492; W.

CHEM E 461 Electrochemical Engineering (3) Schwartz Explores role of thermodynamics, charge transfer kinetics, and mass transfer on behavior of electrochemical systems. Includes cell thermodynamics, faradaic and non-faradaic rate processes, ionic transport, nucleation and growth theories. Applications to chemical sensors, batteries, corrosion, thin film deposition. In-class demonstrations to illustrate concepts. Prerequisite: permission of instructor. Offered: W.

CHEM E 462 Application of Chemical Engineering Principles to Environmental Problems (3) Environmental problems in chemical engineering. Team taught; topics vary from year to year. Includes: geo-media, flow and dispersion through porous media water flow in dry soils, chemistry of radioactive waste, *in situ* site cleanup, *ex situ* site cleanup, colloid and surface science. Prerequisite: 330. Offered: Sp.

CHEM E 465 Reactor Design (3) Application of principles of chemical kinetics to the design of commercial-scale chemical reactors; characterization of batch and flow reactors in homogeneous and heterogeneous systems. Prerequisites: 326, 340. Offered: ASP.

CHEM E 467 Biochemical Engineering (3) Baneyx Application of basic chemical engineering principles to biochemical and biological process industries such as fermentation, enzyme technology, and biological waste treatment. Rapid overview of relevant microbiology, biochemistry, and molecular genetics. Design and analysis of biological reactors and product recovery operations. Prerequisites: 340, organic chemistry; recommended: 465. Offered: jointly with BIOEN 467; W.

CHEM E 468 Air-Pollution Control Equipment Design (3) Designs to control air pollutants from stationary sources. Procedures for calculating design and operating parameters. Fundamental mechanisms and processes of gaseous and particulate control equipment for absorption and adsorption of gaseous pollutants; electrostatic precipitation and filtration of particulate pollutants. Actual case studies. Prerequisite: senior

standing or permission of instructor. Offered: jointly with CIVE 494JM E 468; W.

CHEM E 470 Chemistry of Wood (3) Chemical and physical properties of cellulose, lignin, hemicellulose, and extractives; wood as a raw material for the chemical industry. Prerequisite: CHEM 102 or 238 or permission of instructor. Offered: A.

CHEM E 471 Pulping and Bleaching Processes (3) Conversion of wood to mechanical and chemical pulps. Kraft, sulfite, and semichemical pulping processes. Chemical recovery systems. Bleaching of mechanical and chemical pulps. Offered: jointly with PSE 476; W.

CHEM E 472 Papermaking Processes (3) Fiber sources and properties. Secondary fibers. Stock preparation, sheet forming, water removal, finishing. Coating, lamination, and printing. Paper products. Offered: jointly with PSE 477; W.

CHEM E 473 Pulp and Paper Laboratory (2) Laboratory experiments in chemical and semichemical pulping of wood. Bleaching of chemical and high-yield pulps. Physical and chemical characteristics of pulp fibers. Prerequisite: PSE 476. Offered: jointly with PSE 478; Sp.

CHEM E 475 Computer Analysis in Chemical Engineering (3) Model building/simulation of chemical engineering processes: reactor design, fiber spinning, electrochemistry, biotech processes. Numerical methods include integrating ordinary differential equations as initial and boundary-value problems; finite difference, collocation, Galerkin methods. For each model the appropriate tool is developed. Offered: A.

CHEM E 477 Prokaryotic Molecular Biology Applications to Engineering (3) Lidstrom For engineers with no prior experience in the biological sciences. Covers fundamentals and concepts of molecular biology and directed genetic modification strategies using prokaryotic microorganisms as examples. Focus on approaches, techniques, and relevance to engineered systems. Prerequisite: organic chemistry. Recommended: 467 or BIOEN 450.

CHEM E 480 Process Dynamics and Control (4) Analysis of the dynamics of simple chemical process units and systems; applications to stability, control, and instrumentation of such processes. Weekly two-hour laboratory included. Prerequisites: 435, 465. Offered: AW.

CHEM E 481 Process Optimization (3) Concepts and techniques of optimizing chemical engineering processes and systems, including classical and direct methods of search, linear and nonlinear programming, dynamic programming, statistical experimental design, and evolutionary operation. Prerequisite: 485. Offered: Sp.

CHEM E 482 Advanced Topics in Process Control (3) Holt, Ricker Current topics in process control design and analysis. Possible topics include robustness analysis and design, time delay compensation, modern frequency response techniques, discrete control, adaptive control, model-based control, and nonlinear control. Prerequisite: 480.

CHEM E 485 Process Design I (3) Applied economics in chemical engineering design and operations; market survey and plant location; introduction to plant and process design. Prerequisite: 480. Offered: W.

CHEM E 486 Process Design II (5) Comprehensive design of a specific process, including economic feasibility studies, utilization of market survey and plant location studies, process equipment design and optimization, and overall plant integration and layout. Prerequisite: 485. Offered: Sp.

CHEM E 490 Engineering Materials for Biomedical Applications (3) Hoffman Combined applica-

tion of the principles of physical chemistry, biochemistry, materials engineering, mass transfer, and fluid mechanics to biomedical problems. Case studies include considerations of the selection of materials, the design and the operation of instruments, components of, or entire, artificial organs (heart, kidney, lung) and artificial structural elements (bone, teeth, skin), all for use in contact with body fluids. Prerequisite: organic chemistry or permission of instructor. Offered: jointly with BIOEN 490; odd years; W.

CHEM E 491 Controlled Release Systems—Principles and Applications (3) *Hoffman* Mechanisms or controlled release of active agents and the development of useful systems for this purpose. Release mechanisms include diffusive, convective, or erosive driving forces. Applications to the biomedical, agricultural, forestry, and oceanography fields. Some special case studies covered in detail. Prerequisite: permission of instructor. Offered: jointly with BIOEN 491; even years; W.

CHEM E 495 Physicochemical Transport Phenomena (3) Low Reynolds number hydrodynamics for flow around solid and fluid spheres and near surfaces. Convective diffusion in liquids within capillary tubes and outside the flat plate, the rotating disk, the sphere. Flow and convective diffusion in porous media. Electrokinetic phenomena, including electrophoresis, electro-osmosis, streaming potential. Applications to electrochemistry. Prerequisite: 330.

CHEM E 498 Special Topics in Chemical Engineering (1-4, max. 12) Topics of current interest in the field. Subject matter changes from year to year. Prerequisite: permission of instructor.

CHEM E 499- Undergraduate Research (1-6, max. 12) Independent research projects in chemical engineering. Prerequisites: GPA of 3.0 in Chemical Engineering courses and permission of instructor. Offered: AWPSP.

Courses for Graduates Only

CHEM E 510 Mathematical Foundations of Systems Theory (4) *Damborg* Mathematical foundations for system theory presented from an engineering viewpoint. Includes set theory; functions, inverse functions; metric spaces; finite dimensional linear spaces; linear operators on finite dimensional spaces; projections on Hilbert spaces. Applications to engineering systems stressed. Prerequisite: graduate standing or permission of instructor. Offered: jointly with A A 546/E E/M E 510; A.

CHEM E 511 Biomaterials Seminar (1) *Hoffman, Horbett, Ratner* Presentation of student research results. Credit/no credit only. Prerequisite: permission of instructor. Offered: jointly with BIOEN 511; AWPSP.

CHEM E 523 Seminar in Chemical Engineering (1) Topics of current interest in chemical engineering. Credit/no credit only. Offered: AWPSP.

CHEM E 525 Chemical Engineering Thermodynamics (4) Review of principles of thermodynamics. Applications to problems in multiphase and multicomponent systems; theories of solutions. Prerequisite: undergraduate thermodynamics. Offered: A.

CHEM E 526 Topics in Thermodynamics (3) Classical and molecular thermodynamics of phase equilibria, solution theory, thermodynamic stability, and critical phenomena. Prerequisite: 525 or permission of instructor.

CHEM E 530 Momentum, Heat, and Mass Transfer I (4) Derivation of the differential equations for mass, energy, and momentum transport. Principles of fluid mechanics; creeping flow, turbulence, boundary-layer theory. Offered: A.

CHEM E 531 Momentum, Heat, and Mass Transfer II (4) Continuation of 530. Flows of fluid-particle systems; convective heat transfer, natural convection. Prerequisite: 530. Offered: W.

CHEM E 532 Separation Processes (3) Design of industrial processes for separation and purification of materials. Covers classification and selection of separation techniques, efficiency of separators, energy conservation concepts, and methods for design calculations.

CHEM E 533 Mass Transfer (3) Molecular mass transport; single-phase mixing; age distributions and residence time analysis; transfer across interfaces; coupled heat and mass transfer; effects of chemical reaction; design considerations.

CHEM E 555 Interfacial Phenomena (4) *Berg* Surface tension, capillary statics, wetting and spreading phenomena; thermodynamics of capillary systems, adsorption, surfactant monolayers and micellar solutions; capillary hydrodynamics, interfacial turbulence and applications in distillation, absorption, and extraction. Prerequisites: 525, 530, or permission of instructor. Offered: even years.

CHEM E 556 Principles and Applications of Colloidal Materials (3/4) *Berg, Hoffman* Preparation, stabilization, properties, and destruction of important colloidal materials. The theory and structure of the electrical double layer, electrokinetics. Includes selected case studies pertinent to air and water pollution, biological fluids, industrial processes. Offered: odd years.

CHEM E 558 Surface Analysis (3) *Ratner* Understanding of solid surfaces for research and development in microelectronics, catalysis, adhesion, biomaterials science, wear, and corrosion science. Newer methods available to study surfaces of materials. Electron emission spectroscopies (ESCA, Auger); ion scattering, ion spectroscopic, photon spectroscopic, and thermodynamic methods. Offered: jointly with BIOEN 592; W.

CHEM E 559 Thin Film Science, Engineering, and Technology (3) *Rogers* The physics, chemistry, and engineering aspects of thin film deposition and technology. Vapor phase deposition emphasized. Topics include reactor types, vapor phase transport and hydrodynamics, surface and mass transport limited kinetics, nucleation and growth, homoepitaxy, heteroepitaxy, and thin film characterization. Prerequisite: permission of instructor. Offered: jointly with MSE 559.

CHEM E 560 Reactions at Solid Surfaces (3) *Stuve* Fundamental studies of adsorption systems and reactions that occur at surfaces with application toward heterogeneous catalysis, electrochemistry, etching, and corrosion. Analysis of reaction poisons and promoters, acid-base theory of metal surfaces, jellium theory of metals, and water and ion adsorption, plus other topics of current interest. Recommended: 558 or CHEM 560.

CHEM E 562 Hazardous Air Pollution (3) Control of emission of hazardous or toxic air pollutants. Government regulations, determination of needed control efficiency. Emission control by thermal incineration, catalytic incineration, flares, condensation, carbon adsorption, and adsorption (wet and dry). Hazardous waste incinerators. Case studies. Offered: jointly with CEWA 562; W.

CHEM E 564 Applications of Chemical Kinetics (3) Fast reactions and highly energetic reactions with applications to combustion, explosions, and lasers. Coupling of transport processes and reaction rates, photochemical kinetics, intermolecular energy transfer, free radical, and chain reaction kinetics. Rate plasmas, flames, and biological systems.

CHEM E 565 Kinetics and Catalysis (3) *Finlayson, Krieger, Stuve* Homogeneous and heterogeneous systems with emphasis on chemical engineering principles applied to industrial reactor design. Prerequisite: 525. Offered: W.

CHEM E 566 Control of Gaseous Air Pollutants (3) *Pilat* Physical and chemical processes used to control gaseous air pollutants. Absorption into liquids. Aqueous spray dryer scrubbers. Adsorption beds. Control of sulfur oxide and nitrogen oxide. Case studies of control systems. Prerequisite: 435 or 468 or permission of instructor. Offered: jointly with CEWA 566; even years; Sp.

CHEM E 567 Control of Particulate Air Pollutants (3) *Pilat* Processes used to control emissions of particulate air pollutants. Use of settling chambers, cyclones, fabric filters, wet scrubbers, and electrostatic precipitators to control aerosol particles. Case studies of particulate air-pollutant control systems. Prerequisite: 468 or permission of instructor. Offered: jointly with CEWA 567; odd years; A.

CHEM E 570 Chemistry of High Polymers (3, max. 6) *Allan* Fundamentals of high polymer chemistry, including kinetics of addition and condensation polymerization, the determination of average molecular weights and chain length distributions, solution properties and the relationship between molecular structure and plastic film and fiber properties of various polymers. Prerequisite: an undergraduate sequence in organic chemistry. Offered: W.

CHEM E 571 Polymer Physics and Engineering (3) *Selzeris* Description and analysis of methods for processing polymeric materials. Introduction to solid polymer physics with emphasis on the coupling of structure morphology and properties. Development of structure-property models for quantitative description and control of properties in synthetic and natural polymers and composite materials. Offered: A.

CHEM E 572 Advanced Polymeric Composites (3) *Selzeris* Design, manufacture, and properties of organic and inorganic particle and fiber-reinforced polymers. Advanced techniques for characterization of processing and properties, including anisotropic elasticity/viscoelasticity theory, polymerization and network formation of matrices, theory of reinforcement, environmental and chemical effects. Prerequisite: 571 or MSE 423 or permission of instructor. Offered: Sp.

CHEM E 575 Nonlinear Analysis in Chemical Engineering (3) *Finlayson* Comparison of numerical techniques: similarity, perturbation, finite difference, Galerkin, orthogonal collocation methods as applied to nonlinear chemical engineering problems. Offered: odd years.

CHEM E 580 Topics in Chemical Engineering Design (3, max. 9) Lectures and seminars on current design methods in chemical engineering, including technical and economic feasibility of processes, design and optimization of process equipment, and environmental and social constraints. Prerequisite: undergraduate chemical engineering design, admission to chemical engineering nonthesis master's program, or permission of instructor.

CHEM E 582 Advanced Topics in Process Control (3) *Holt, Ricker* Current topics in process control design and analysis. Possible topics include robustness analysis and design, time delay compensation, modern frequency response techniques, discrete control, adaptive control, model-based control, and nonlinear control. Prerequisites: undergraduate control class and graduate standing.

CHEM E 590 Advanced Topics in Biomaterials (3) Major, controversial issues in application of synthetic materials to medical problems. Blood compatibility, bioadhesion, intraocular lenses, contact lenses, polyurethanes, biodegradation, protein adsorption, corrosion, bone fixation, new materials, artificial heart, medical device regulation. Prerequisite: 490 or BIOEN 490. Offered: jointly with BIOEN 590.

CHEM E 591 Robotics and Control Systems Colloquium (1, max. 3) Colloquium on current topics in robotics and control systems analysis and design.

Topics presented by invited speakers as well as on-campus speakers. Emphasis on the cross-disciplinary nature of robotics and control systems. Offered: jointly with A/E EJM E 591; AWSp.

CHEM E 598- Effective Teaching of Chemical Engineering ([1/2]-, max. 3) *Finlayson* Topics/activities include: curriculum development: outlining a course, comparing textbooks, preparing lectures, use of lectures versus quiz sections, microteaching, other modes of instruction, e.g., self-paced, use of design problems. Tests: creating and grading. Role of computers, review of engineering software, diversity, international teaching assistants, sexual harassment, assessment of teaching, resume. Offered: WSp.

CHEM E 599 Current Topics in Chemical Engineering (1-3, max. 12) Readings or lectures and discussions of topics of current interest in the field of chemical engineering. Subject matter changes from year to year. Prerequisite: permission of instructor.

CHEM E 600 Independent Study or Research (*) Offered: AWSpS.

CHEM E 700 Master's Thesis (*) Offered: AWSpS.

CHEM E 800 Doctoral Dissertation (*) Offered: AWSpS.

Civil Engineering

201 More

Civil engineering is a profession which interfaces closely with society in the planning, design, construction, and management of facilities serving the needs of people. These activities include all transportation modes: highways, aerospace, rivers, and harbors; water resources, hydraulics, and coastal engineering; structures, mechanics, and geotechnical engineering; surveying, mapping, and photogrammetry; urban planning and development; water supply, wastewater treatment, and water-quality management; solid- and hazardous-waste disposal; and quality control and management of the air resource.

A civil engineer may specialize in one or several of these activities and may further specialize in a particular function, such as design or management. The work frequently provides close associations with the legal profession, urban and regional planners, economists, public officials, biologists chemists, financial consultants, architects, and system analysts. Education and practice require a consideration not only of the technological-science aspects of a particular problem but also of its relationship to social, economic, political, and environmental constraints.

To accommodate these wide interests, the department is organized into three academic programs: Structural and Geotechnical Engineering and Mechanics; Transportation, Surveying, and Construction Engineering; Environmental Engineering and Science.

Undergraduate Program

Bachelor of Science in Civil Engineering

Departmental Objectives

The department's objectives are: to provide a quality, broad-based education with breadth and depth in major areas of civil engineering; to prepare students for entry into professional engineering practice and lifelong learning; to prepare well-qualified students for graduate studies in specialty fields within civil engineering, leading to careers in professional practice, research or academics; to maintain a tradition of excellence in classroom teaching, encourage innovation, and use evaluation by students and faculty to improve

continually. The department meets these objectives by providing a curriculum that includes introduction to major areas of civil engineering, development of engineering analysis in each area (drawing on mathematics and basic sciences), and utilization of modern methodologies, theories, and tools.

The curriculum integrates engineering design throughout, incorporating key elements of the design process in a wide range of courses. Each student is required to take a design seminar and at least one major comprehensive design course in the senior year, building on fundamentals from mathematics, sciences, major areas of civil engineering, and communication skills. Additionally, students may take independent study or research courses, working one-on-one with faculty and advanced graduate students. Special attention is focused on prospective students, seeking excellence, emphasizing recruitment of women, underrepresented minorities, and persons of disability.

Admission Requirements: Admission to the department is usually at the junior level. Enrollment in the department is limited; students who desire entrance must formally apply to, and be accepted by, the departmental admissions committee. The primary admission criterion is degree of qualification for probable success in the engineering degree program as evidenced by academic performance, work experience, and other factors. Specific courses required are: MATH 124, 125, 126, 308; CHEM 140; PHYS 121/131, 122/132; 5 credits of English composition; and CSE/ENGR 142, ENGR 210, 220, 230. Prospective students should obtain a copy of the departmental undergraduate advising guide and the departmental application form, both of which are available in 201-A More.

Graduation Requirements: The minimum number of credits required for graduation with the Bachelor of Science in Civil Engineering degree is 192, of which 77 credits are Civil Engineering departmental requirements and 115 are College of Engineering and general education requirements. Upper-division requirements in civil engineering include a common core of specified courses taken in the junior year.

Correspondence and Information

Undergraduate Advising Office
201-A More, Box 352700

Graduate Program

S. Kramer, Graduate Program Coordinator

The Department of Civil Engineering offers courses leading to the degrees of Master of Science in Civil Engineering and Doctor of Philosophy. The department also provides authorized options leading to the College-wide Master of Science and Master of Science in Engineering degrees.

The three master's programs are intended to accommodate the needs of three categories of students: the M.S.C.E. for those who have completed an undergraduate degree in civil engineering and plan to continue with their professional training; the College-wide M.S.E. for other engineering graduates who wish to do graduate work in civil engineering; and the College-wide M.S. for those whose Bachelor of Science degrees are not in engineering, but who desire to apply their training in science to the solution of problems in some specific sector related to civil engineering. The non-engineer may take additional course work to obtain an M.S.E. degree.

Graduate work is offered in most fields of civil engineering. To accommodate these wide areas of interest, the department is organized into three academic graduate programs: Structural and Geotechnical Engineering and Mechanics; Transportation, Surveying, and Construction Engineering; and Environmental Engineering and Science.

Priority for admission is based on an applicant's apparent ability to progress satisfactorily in a graduate degree program. The applicant's scholastic record is of major importance; usually, at least a B, or 3.00 GPA in the junior and senior years is required. Consideration is also given to the Graduate Record Examination scores and other information.

Degree Requirements

The requirement for the master's degree is a minimum of 39 credits, of which 30 must be in formal course work and 9 in thesis. A nonthesis program is available, requiring a minimum of 45 credits, of which at least 3 credits will be individual study with the advisory committee chairperson. The Environmental Engineering and Science Program requires 45 credits for both the thesis and nonthesis degree. For all master's degrees, at least 3 credits must be from outside the major field of study.

Students working for the Ph.D. degree must complete an approved program of studies and research normally requiring an additional two or three years beyond the master's degree.

Financial Aid

Research and teaching assistantships are available on a competitive basis. The number of positions depends upon the current level of funding. Additionally, there are a limited number of fellowships, scholarships, and traineeships.

Research Facilities

More Hall and Wilcox Hall have structural, concrete, and bituminous materials, soil mechanics, surveying and photogrammetry, computer, water-quality, solid-wastes, and air-quality laboratories as well as an air-monitoring station and equipment for fieldwork in the construction, water, air, and solid-waste programs. Facilities for experimental studies in hydraulics and coastal engineering and in fluid mechanics are located in the Harris Hydraulics Laboratory.

Correspondence and Information

Graduate Program Assistant
Advising Office, 201-A More, Box 352700

Faculty

Chair

John F. Ferguson

Professors

Benjamin, Mark M. * 1977; MS, 1973, MS, 1975, PhD, 1979, Stanford University; chemistry of natural waters, chemical and biological treatment of water and wastewater.

Bogan, Richard H. * 1954, (Emeritus); DSc, 1954, Massachusetts Institute of Technology; environmental engineering.

Brown, Colin B. * 1969, (Emeritus); PhD, 1962, University of Minnesota; structural engineering and systems.

Burges, Stephen J. * 1970; PhD, 1970, Stanford University; surface and ground water hydrology, water resource systems analysis and design.

Carlson, Dale A. * 1955, (Emeritus); PhD, 1960, University of Wisconsin; water resources and solid-waste management.

Charlson, Robert J. * 1965, (Adjunct); PhD, 1964, University of Washington; atmospheric chemistry, aerosol physics, aerosol/cloud/climate interaction.

Colcord, J. E. * 1949, (Emeritus); MSCE, 1949, University of Minnesota; surveying engineering.

Dunn, Walter L. 1954, (Emeritus); MPH, 1953, University of California (Berkeley); transportation planning.

Elias, Ziad * 1969; DSc, 1963, Massachusetts Institute of Technology; engineering mechanics.

Evans, Roger J. * 1966, (Emeritus); PhD, 1965, University of California (Berkeley); engineering mechanics, structural engineering.

Ferguson, John F. * 1974; PhD, 1970, Stanford University; chemical and biological processes in water and waste treatment and in natural water systems.

Hammer, Vernon B. 1947, (Emeritus); MS, 1941, Harvard University; solid-waste management.

Hartz, Billy J. * 1955, (Emeritus); PhD, 1955, University of California (Berkeley); engineering mechanics, structural mechanics.

Hinze, Jimmie W. * 1984; PhD, 1976, Stanford University; construction engineering and management.

Holtz, Robert Dean * 1988; PhD, 1970, Northwestern University; geotechnical engineering.

Larson, Timothy * 1970; PhD, 1976, University of Washington; airborne particles, air quality modeling, and instrument development.

Lettenmaier, Dennis P. * 1973; PhD, 1975, University of Washington; systems analysis and water resources planning.

Mahoney, Joseph P. * 1978; PhD, 1979, Texas A&M University; construction materials, pavement systems.

Manning, Fred L. * 1986; PhD, 1983, Massachusetts Institute of Technology; traffic flow theory, networks, econometric methods, equilibrium in transportation markets.

Mar, Brian W. * 1967; PhD, 1958, University of Washington; system engineering, environmental management, interdisciplinary management.

Mattock, Alan * 1964, (Emeritus); PhD, 1955, University of London (UK); structural behavior and design.

Meese, Richard H. 1975, (Emeritus); MS, 1941, Harvard University; soil mechanics and foundations.

Miller, Gregory * 1983; PhD, 1984, Northwestern University; structural materials, solid mechanics, nonlinear dynamics.

Neece, Ronald E. * 1959; (Emeritus); DSc, 1958, Massachusetts Institute of Technology; hydraulic and coastal engineering.

Nihan, Nancy L. * 1973; PhD, 1970, Northwestern University; transportation planning and systems analysis.

Palmer, Richard * 1979; PhD, 1979, Johns Hopkins University; civil engineering systems, computer methods, water resources planning and management.

Pilat, Michael J. * 1967; PhD, 1967, University of Washington; air resources engineering (design of air-pollution-control equipment).

Reed, Dorothy * 1983; MSE, 1977, PhD, 1980, Princeton University; structural and wind engineering, and expert systems.

Richay, Eugene 1954, (Emeritus); MS, 1947, MSCE, 1948, California Institute of Technology; PhD, 1955, Stanford University; hydraulic engineering.

Roeder, Charles W. * 1977; PhD, 1977, University of California (Berkeley); structures and materials.

Rossano, August T. 1963, (Emeritus); MS, 1941, ScD, 1954, Harvard University; air resources.

Rutherford, G. Scott * 1981; PhD, 1974, Northwestern University; transportation planning and engineering.

Sawhill, Roy 1952, (Emeritus); MEng, 1952, University of California (Berkeley).

Schneider, Jerry * 1967; (Emeritus); PhD, 1966, University of Pennsylvania; metropolitan area and regional planning, transportation and other urban models.

Seabloom, Robert * 1954, (Emeritus); MSCE, 1956, University of Washington; water-quality and solid-waste management.

Stanton, John F. * 1978; PhD, 1978, University of California (Berkeley); structural engineering, analysis and design.

Stensel, H. David * 1983; PhD, 1971, Cornell University; biological wastewater treatment, fixed film reactors, mass transfer mechanics, modeling.

Sylvester, Robert O. 1947, (Emeritus); MS, 1941, Harvard University; water resources.

Terrel, Ronald L. 1967, (Emeritus); MSCE, 1961, Purdue University; PhD, 1967, University of California (Berkeley).

Veress, Sándor A. * 1965; (Emeritus); PhD, 1969, Laval University (Canada); photogrammetry.

Welch, Eugene B. * 1968; PhD, 1967, University of Washington; water resources and aquatic biology.

Wenk, Edward 1970, (Emeritus); MS, 1947, Harvard University; PhD, 1950, Johns Hopkins University.

Yeh, Harry H. * 1983; PhD, 1983, University of California (Berkeley); fluid mechanics, water wave motions, coastal and hydraulic engineering.

Associate Professors

Bentil, Kwaku K. * 1991, (Adjunct); PhD, 1990, University of Florida; project management, safety, robotics, affordable housing, construction site waste and recycling.

Chenoweth, Harry H. 1946, (Emeritus); MSCE, 1957, University of Washington; engineering mechanics and hydraulic engineering.

Covert, David S. * 1975, (Adjunct Research); PhD, 1974, University of Washington; atmospheric chemistry, aerosol physics and instrumentation.

Goldblatt, Steven M. 1982, (Adjunct); JD, 1977, Golden Gate University; construction accounting, labor relations, and construction law.

Harrison, Halstead * 1971, (Adjunct); PhD, 1960, Stanford University; atmospheric chemistry, dispersion modeling, radiative transfer.

Horner, Richard B. * 1981, (Adjunct Research); PhD, 1978, University of Washington; wetlands, conservation and storm water management.

Janssen, Donald J. * 1985; PhD, 1985, University of Illinois; construction materials, pavements.

Kent, Joseph C. * 1952, (Emeritus); PhD, 1952, University of California (Berkeley); hydraulic engineering.

Kramer, Steven * 1984; PhD, 1984, University of California (Berkeley); soil mechanics, foundation engineering, geotechnical earthquake engineering.

Massmann, Joel W. * 1991; PhD, 1987, University of British Columbia (Canada); groundwater hydrology, subsurface contaminant transport, site remediation, applied decision analysis.

Miller, William * 1951, (Emeritus); MSCE, 1952, University of Washington; materials.

Morgan, Michael S. * 1974, (Adjunct); DSc, 1972, Massachusetts Institute of Technology; applied respiratory, physiology and inhalation toxicology.

Ongert, Jerry E. * 1984, (Adjunct); PhD, 1973, University of Michigan; public water supply, solid waste and water quality management; waterborne pathogens.

Spyridakis, Dimitris * 1970; PhD, 1965, University of Wisconsin; soil and water chemistry.

Strand, Stuart E. * 1982, (Adjunct Research); PhD, 1982, Pennsylvania State University; forest biotechnology, environmental pollution control.

Strausser, Howard * 1955, (Emeritus); MEng, 1950, Johns Hopkins University; hydraulic engineering.

Assistant Professors

Dunston, Phillip S. 1994; MS, 1992, PhD, 1994, North Carolina State University; construction engineering

and management: automation, process planning, productivity; safety.

Eberhard, Marc O. * 1989; PhD, 1989, University of Illinois; structural analysis and design, reinforced concrete, earthquake engineering, nondestructive testing.

MacRae, Gregory Anthony 1994; PhD, 1990, University of Canterbury (New Zealand); earthquake engineering, steel and reinforced concrete structures, seismic assessment and retrofit.

Petroff, Catherine * 1993; PhD, 1993, California Institute of Technology; sediment transport, coastal engineering, and environmental fluid mechanics.

Taylor, Teresa * 1992; PhD, 1988, Washington State University; geotechnical/geological engineering, physical modeling, centrifuge modeling.

Turkiyyah, George * 1991; PhD, 1990, Carnegie-Mellon University; computer-aided engineering, finite element modeling.

Senior Lecturer

Bucknam, Ronald E. 1985; PhD, 1964, University of Illinois.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

CIVE 250 Environmental Pollution: Assessing Problems and Solutions (5) NW, QSR Welch Problems in air, water, land environment caused by increasing demands on resources; their definition, control or prospects for control from engineering viewpoint. Ecological cycles, quantity/quality of wastes, biological effects of pollutants, energy, legislation and policy. Offered: Sp.

CIVE 306 Construction Engineering I (3) Dunston, Hinze Introduction to construction engineering, planning, scheduling, methods, contracts, and specifications. Production estimates; equipment selection; ownership and operating costs; role of the engineer in construction and cost estimating. Prerequisite: Civil Engineering student or permission of instructor or adviser. Offered: WSp.

CIVE 316 Surveying Engineering (4) Application of geodesy to engineering surveys. Modern measurement and mapping techniques. Computer adjustment of measurements and analysis of error. Plane coordinate systems and transformation. Horizontal and vertical curve computations and layout. Leveling and datum considerations. Introduction to photogrammetry, cadastral surveys and construction surveys. Prerequisites: Civil Engineering student or permission of instructor or adviser, CSE/ENGR 142, and linear algebra. Recommended: statistics. Offered: ASP.

CIVE 320 Transportation Engineering I (3) Manning, Rutherford Review of operating characteristics of vehicles and methods used to predict travel demand and capacity supply. Study of basic geometric fundamentals and their relationship to design with emphasis on highways, and management of transportation systems. Prerequisite: Civil Engineering student or permission of instructor or adviser and 316 which may be taken concurrently. Offered: AW.

CIVE 342 Fluid Mechanics (4) Burges, Petroff, Yeh Elementary mechanics of incompressible fluids. Hydrostatics. Continuity, energy, and momentum equations. Introduction to potential flow. Resistance phenomena for laminar and turbulent flows. Dynamic similitude. Prerequisites: Civil Engineering student or permission of instructor or adviser and ENGR 210 and 230. Offered: ASP.

CIVE 345 Hydraulic Engineering (4) Massmann, Petroff, Yeh Extension and application of fluid me-

chanics principles to hydraulic engineering problems. Open channel flow, pipeline systems, turbomachinery, unsteady flow in pipes, diffusion and mixing processes, groundwater, surface water hydrology. Prerequisites: Civil Engineering student or permission of instructor or adviser and 342. Offered: AW.

CIVE 350 Environmental Engineering—Water and Air Quality (4) *Benjamin, Ferguson, Pilat, Steusel* Description of water and air resources and parameters that characterize their quality, how their use alters their properties. Emphasis on effects of civil engineering projects; significance to engineer/scientist and society. Laboratory sessions stress water-quality analysis techniques and significance. Prerequisite: Civil Engineering student or permission of instructor or adviser. Offered: AW.

CIVE 351 Water Supply and Waste Management (3) *Benjamin, Stensel* Fundamentals of water supply: surface- and ground-water sources, demand, and system design. Municipal sewerage systems: wastewater quantity and quality, and fundamentals of engineering design for collection, treatment, and disposal. Solid wastes: characteristics and quantities, collection, treatment, and disposal. Prerequisites: Civil Engineering student or permission of instructor or adviser, 345 which may be taken concurrently, and 350. Offered: WSP.

CIVE 363 Constructional Materials (4) *Janssen, MacRae, Mahoney* General treatment of physical and mechanical properties and engineering behavior of metallic and nonmetallic materials. Steel, aluminum, concrete, wood. Laboratory testing, instrumentation, and investigation into macrobehavior. Correlation with microstructure and various aspects of materials science. Prerequisites: Civil Engineering student or permission of instructor or adviser and ENGR 220. Offered: ASP.

CIVE 366 Basic Soil Mechanics (4) *Kramer, Taylor* Introduction to basic soil properties, soil classification, volumetric relationships, compaction, consolidation, soil rheology, shear strength, bearing capacity, and lateral stresses against retaining structures. Prerequisites: Civil Engineering student or permission of instructor or adviser and ENGR 220. Offered: WSP.

CIVE 379 Elementary Structures I (3) *Elias, MacRae* Review of engineering theory of beams, combined stresses, beam deflections, indeterminate beams, principle of virtual work, application to beams, unsymmetrical bending, shear center, torsion of open and thin-walled sections, composite beams, inelastic bending of beams, elastic stability, beam-columns, column design formulas. Prerequisites: Civil Engineering student or permission of instructor or adviser and ENGR 220. Offered: ASP.

CIVE 380 Elementary Structures II (3) *Elias, Roeder* Classification and idealization of structures. Theorem of virtual work. Unit load method for beams, frames, and trusses. Matrix formulation of theorem of virtual work. Force method for statically determinate and indeterminate method. Moment distribution for beams and frames including sway analysis. Prerequisites: Civil Engineering student or permission of instructor or adviser and 379. Offered: AW.

CIVE 381 Concepts of Structural Design (3) *MacRae, Reed, Stanton* Planning, design, and constructional aspects of structures. Criteria for structural adequacy and efficiency. Examination of the design process. Introduction to design of components. Use of influence lines. Prerequisites: Civil Engineering student or permission of instructor or adviser and 380. Offered: WSP.

CIVE 390 Civil Engineering Systems (3) *Mar, Massman, Palmer* Introduction to civil engineering system processes. Decision methods, economic considerations, and optimization. Examples illustrating quantitative and subjective aspects of civil engineering

practice. Prerequisite: Civil Engineering student or permission of instructor or adviser. Offered: Sp.

CIVE 400 Computer-Aided Design (3) *Schneider* Review and evaluation of computer-aided design hardware, software, and applications in civil engineering. Use of interactive graphic software to solve complex, multiobjective design problems. Recommended: ENGR 123 or equivalent. Offered: A.

CIVE 405 Construction Planning and Scheduling (3) *Hinze* Principles of construction planning and scheduling, including network analysis of construction activities, examination of arrow and precedence diagrams, time-cost tradeoffs, resource leveling, resource allocation, PERT, integrated cost/schedule systems, computer applications, and a CPM project. Offered: W.

CIVE 406 Construction Engineering II (3) *Dunston* Heavy construction equipment. Equipment economics, contractor equipment policies, equipment specifications, selection and performance of equipment, estimating productivity of construction equipment, and engineering support for construction operating. Prerequisite: 306 or permission of instructor. Offered: A.

CIVE 407 Contracts and Specifications (3) *Hinze* Construction industry, forms of organizations, real property laws, and bidding procedures. Basic elements of contracts, types of specifications, general conditions of standard construction contracts, legal disputes related to construction contract provisions, surety bonds and construction insurance. Prerequisite: 306 or permission of instructor. Offered: ASP.

CIVE 410 Traffic Engineering Fundamentals and Surveys (3) *Nihan* General review of the fundamentals of traffic engineering, including their relationship to transportation operations management and planning, with special emphasis on traffic engineering field surveys and data analysis. Prerequisite: 320 or permission of instructor. Offered: A.

CIVE 412 Traffic Flow Theory (3) *Manning* Introduction to traffic flow theory, characteristics. Measurement, statistical representation of traffic characteristics. Speed-flow-concentration models and relationship to level of service, highway capacity. Application of queuing theory to traffic events; introduction to traffic flow simulation. Prerequisites: senior standing in Civil Engineering and 320. Offered: W.

CIVE 416 Urban Transportation Planning and Design (3) *Nihan, Rutherford* Brief review of major issues in urban transportation planning. Planning process discussed and transportation models introduced. Uses a systems framework, including goals and objectives, evaluation, implementation, and monitoring. A design term project, individual or small groups, utilizes material presented on a contemporary problem. Prerequisites: senior standing and 320 or graduate standing and permission of instructor. Offered: A.

CIVE 421 Pavement Design (3) *Janssen, Mahoney* Current and developing procedures for the structural thickness design of pavements. Bituminous and concrete pavements for highways, airports, and special heavy loading. Elastic layered systems, slab theory. Performance evaluation for maintenance and overlay design. Prerequisite: senior or graduate standing in Civil Engineering. Offered: ASP.

CIVE 422 Construction Materials II (4) *Janssen* Types, sources, uses, performance behavior from construction point of view of aggregates; asphalt products and mixtures; Portland cement, concrete, and other materials the civil engineer is responsible for selecting and manufacturing on job site. Includes laboratory work. Prerequisites: senior or graduate standing in civil engineering and 363 or equivalent. Offered: A.

CIVE 423 Heritage of Civil Engineering (3/4) *I&S Colcord* Contribution of civil engineering to civilization based on the lives and projects of prominent engineers and cultures. Incidents and individuals

from prehistory to the nineteenth century give the student an awareness of the profession and its influence on society. Industrial archaeology and historic sites are considered. An additional 1 credit may be earned by participating in a special project. Emphasis on the control of elements and the methodology, planning, objectives, and reasons for the project. May be used as social science distribution. Prerequisite: junior standing. Offered: W.

CIVE 430 Issues in Professional Engineering Practice (3) *I&S Bucknam* Professional practice issues encountered in engineering firms and agencies, including professionalism, marketing services, proposal and design contract preparation, effective team communications, basics of total quality management, applied engineering ethics with case histories, loss prevention, limitation of liability, alternate dispute resolution methods. Prerequisite: senior or graduate standing or permission of instructor. Offered: AS.

CIVE 431 Seismology and Earthquake Engineering (3) *NW Reed, Roeder* Presents an overview of earthquake processes and details of the characteristics of destructive ground motion; illustrates the effects of such motion on engineering structures; reviews current practice in estimating earthquake hazards for important structures such as nuclear power plants. Prerequisite: MATH 307 or permission of instructor. Offered: jointly with GPHYS 431; W.

CIVE 436 Foundation Design (3) *Holtz, Taylor* Design considerations for foundations and retaining structures. Subsurface investigations and determination of soil properties for design. Design of shallow and deep foundations and retaining structures. Foundations and soil considerations for waterfront structures. Prerequisite: 366. Offered: AWSP.

CIVE 437 Engineering Geology I (3) *Taylor* General overview of engineering geology and its importance to civil engineers. Topics include geologic processes, hazards, origin and classification of geologic materials, data synthesis, and natural construction materials. Prerequisite: GEOL 205 or equivalent. Offered: A.

CIVE 440 Design Seminar (4) Fundamentals of integrated civil engineering design, professional services marketing, project management, team dynamics, total quality management, value engineering, professional liability, and applied ethics in engineering practice. Emphasis on written and oral communications, and on ethical, social, and economic factors in engineering design. Prerequisite: senior standing or permission of instructor. Offered: A.

CIVE 441 Highway and Traffic Engineering—Geometric Design (4) *Manning* Factors and elements in geometric design of arterials, intersections, freeways, interchanges, including problem solution. Prerequisites: senior standing in Civil Engineering, 320, and 440. 440 may be taken concurrently. Offered: W.

CIVE 442 Structural Geotechnical Design Project (4) *Holtz, Roeder* Comprehensive team design project focusing on structural and geotechnical engineering. Requires design drawings, written reports and oral presentations interfacing with related fields such as aesthetics and architecture, mechanical systems, traffic, environmental planning. Prerequisites: 440, two of 436, 451, 452, 453, 454, and 457; senior standing in Civil Engineering. Offered: WSP.

CIVE 443 Design of Subsurface Remediation Activities (4) *Massmann* Technologies for cleaning sites with subsurface contamination, including include groundwater extraction, vapor extraction, groundwater containment, and *in-situ* treatment. Analytical tools and methods for making design calculations are emphasized. Comprehensive design project involving design and evaluation of site remediation activities required. Prerequisites: 440, 464; senior standing in Civil Engineering. Offered: Sp.

CIVE 444 Water Resources and Hydraulic Engineering Design (4) *Burges, Petroff, Yeh* Opportunity to effect design solutions for projects or major project components in such representative areas as reservoirs and associated systems for flood control, water supply, irrigation and hydroelectric power, surface water control systems, fisheries related projects, small harbors, coastal engineering problems. Prerequisites: 440, senior standing in Civil Engineering. Offered: W.

CIVE 445 Environmental Engineering Design Studies (4) *Stensel* Individual and group design studies involving environmental engineering water and wastewater treatment facilities. Topics include proposal preparation, engineering reports, alternative evaluations, process equipment design, and environmental engineering projects. Presentation of engineering reports on selected design problems. Prerequisites: 351, 345, and 440. 440 may be taken concurrently. Offered: Sp.

CIVE 451 Design of Metal Structures (3) *Miller, Roeder, Stanton, Turkiyyah* Introduction to the design and behavior of metal structures using LRFD concepts. Application of design methods and codes to columns, beams, frames, connections, and tension members. Prerequisite: 381. Recommended: 457 and 458. Offered: ASP.

CIVE 452 Design of Reinforced Concrete Structures (3) *Eberhard, MacRae, Stanton* Fundamentals of design of buildings in reinforced concrete in accordance with current codes and practices. Prerequisite: 381. Offered: ASP.

CIVE 453 Prestressed Concrete Design (3) *Stanton* Analysis, design, and construction of prestressed concrete structures. Prerequisite: 452 or graduate standing. Offered: W.

CIVE 454 Design of Timber Structures (3) *Eberhard, Reed* The design and construction of timber structures, using elements made of sawn wood, glued-laminated wood, and plywood. Prerequisite: 381. Offered: W.

CIVE 455 Structural Unit Masonry (3) *Tawresay* Structural behavior and design of reinforced brick, tile, and unit concrete masonry structures. Prerequisite: 381 or permission of instructor. Offered: jointly with ARCH 426; Sp.

CIVE 457 Advanced Structures I (3) *Eberhard, Elias, Turkiyyah* The displacement method in matrix form with programming applications. Fundamentals of modeling of various types of structures. Prerequisite: 380. Offered: WSP.

CIVE 458 Advanced Structures II (3) *Stanton* Introduction to stability, including a consideration of elastic and inelastic buckling with applications to beam-columns and plates. Introduction to plastic analysis. Prerequisite: 379. Offered: W.

CIVE 459 Advanced Structural Mechanics (3) *Elias* Formulation and solution of the basic equations of elasticity. Applications in 2-D stress analysis, torsion, thermal stresses, and beams on elastic foundation. Plate theory optional. Prerequisite: 379. Offered: A.

CIVE 461 Biological Problems in Water Pollution (3/5) NW Ecological risk assessment of toxic chemicals and problems associated with electrical power production. Considers safety and toxicity and effects on individuals, populations, and communities. Laboratory covers simulation models of chemical exposure and community effects. Prerequisite: senior or graduate standing in Fisheries, Engineering, or related field. Offered: jointly with FISH 430; W.

CIVE 462 Ecological Effects of Waste Water (3/5) NW *Welch* Principles of aquatic ecology that relate to causes and effects of water quality problems in lakes and streams. Population growth kinetics, nutrient cy-

cling, eutrophication; acidification, oxygen/temperature requirements, and effects of various wastes on aquatic animals. Prerequisite: senior or graduate standing in Engineering or a science. Offered: jointly with FISH 434; A.

CIVE 464 Subsurface Contaminant Transport (3) *Massmann* Principles of transport through porous media used to study fate and movement of subsurface contamination. Processes include aqueous phase transport, flow of immiscible fluids, vapor transport, solid-liquid-vapor interactions. Techniques for simulating transport processes presented. Effects of subsurface heterogeneities and uncertainties are emphasized. Prerequisites: 342 or equivalent or permission of instructor. Offered: A.

CIVE 472 Introduction to Hydraulics in Water Resources (3) *Yeh* Physics of water movements in natural freshwater bodies and inshore marine waters. Brief review of some essential fluid mechanics. Flow in rivers and streams; motions in lakes, reservoirs, and estuaries. Some aspects of diffusion. Not open to students with undergraduate civil engineering backgrounds. Prerequisites: senior or graduate standing and permission of instructor. Offered: Sp.

CIVE 473 Coastal Engineering I (3) *Yeh* Linear theory of water waves, wave transformations due to boundary conditions, sediment motion, elementary tidal theory; applications illustrated by laboratory experiments and selected case histories. Prerequisite: 342. Offered: Sp.

CIVE 474 Hydraulics of Sediment Transport (3) *Petroff* Introduction to sediment transport in steady flows with emphasis on physical principles governing the motion of sediment particles. Topics include sediment characteristics, initiation of particle motion, particle suspension, bedforms, streambed roughness analysis, sediment discharge formulae, and modeling of scour and deposition in rivers and channels. Prerequisite: 345 Offered: W.

CIVE 475 Analysis Techniques for Groundwater Flow (3) *Burges, Massmann* Development of appropriate equations to describe saturated groundwater flow, and application of numerical methods for solving groundwater flow problems and flow to wells. Participants required to solve specific problems using numerical techniques developed during the course. Prerequisite: 342 or equivalent. Offered: W.

CIVE 476 Physical Hydrology (3) *Burges* Global water picture, data sources and data homogeneity, precipitation, evapotranspiration, hydrographs. Hydrologic data frequency analysis. Hydrologic design: flood mitigation, drainage. Introduction to deterministic and stochastic models. Prerequisite: senior standing in Civil Engineering or permission of instructor. Offered: A.

CIVE 477 Open-Channel Engineering (3) *Petroff, Yeh* Water flow in natural and constructed channels. Analysis and design of canals, transitions, energy dissipators, and similar structures. Analysis of surface profiles and effect of nonlinear alignment on flow. Introduction to river mechanics. Design-oriented problems. Prerequisite: 345. Offered: AW.

CIVE 480 Air-Quality Modeling (3) *Larson* Evaluation of air-quality models relating air pollution emissions to environmental concentrations. Topics include meteorological dispersion models and various "receptor" models based on chemical "fingerprinting" of sources. Emphasizes current problems. Prerequisite: 490 or ATM S/ENV S/CHEM 458 or permission of instructor. Offered: jointly with ATM S 480; W.

CIVE 481 Environmental Engineering Design (3) *Bogan* Introduction to the theory and the practice of planning and design of urban water supply, sewerage, solid wastes, and drainage collection systems. Evaluation of service areas and service requirements and their relationships to urban and regional planning activities. Engineering methods and com-

puter programs for designing basic system elements. Prerequisite: 351. Offered: AW.

CIVE 482 Water and Wastewater Treatment (3) *Benjamin, Stensel* Objectives of water and wastewater treatment; associated physical, chemical, and biological phenomena; design of common treatment systems. Prerequisite: 351 or permission of instructor. Offered: Sp.

CIVE 484 On-Site Wastewater Disposal (3) *Seabloom* Latest information on design, construction, operation, maintenance of individual and small community wastewater disposal systems. Conventional water carriage septic tank soil absorption systems considered with new alternatives, such as mounds, evapotranspiration systems, anaerobic filters, pressure drainfields, sand filters. Nonwater carriage methods studied. Pressure and vacuum sewers introduced. Prerequisite: senior standing. Offered: Sp.

CIVE 485 Aquatic Chemistry (3) *Benjamin, Ferguson* Principles of chemical equilibrium relevant to natural water systems; the nature and effect of chemical interactions of domestic and industrial waste effluents on natural water systems; chemical principles involved in the treatment of water and wastewaters. Prerequisite: one year of general chemistry or equivalent. Offered: ASP.

CIVE 486 Water-Quality Analysis (3) Laboratory evaluation of chemical quality of natural and wastewaters. Theory and application of instrumentation used in water-quality measurement. Prerequisite: senior or graduate standing. Offered: W.

CIVE 487 Solid-Waste Disposal (3) Describes sources and handling of municipal and industrial solid waste, with examination of collection, processing, recycling and resource recovery, and disposal alternatives. Public policy issues, local agencies and solid waste facilities, the legal and regulatory framework are all addressed in context of solid waste engineering. Offered: W.

CIVE 488 Hazardous Wastes Engineering (3) *Stensel* Classification of hazardous wastes; resource conservation, Recovery Act regulations; characteristics and behavior of toxic organics; superfund; groundwater contamination, solutions. Hazardous waste site remedial action; case histories; sampling; landfill design. Stabilization and processing technologies, including incineration, carbon adsorption, emerging techniques. Prerequisite: 351 or permission of instructor. Offered: A.

CIVE 489 Water and Air Quality Sampling (2) *Larson, Welch* Samples collected from lakes, streams, precipitation, and air and resulting (and supplemental) data interpreted for cause-effect and statistical inference. Design for water and air quality monitoring programs. Prerequisite: 462 or permission of instructor. Offered: A.

CIVE 490 Air-Pollution Control (3) *Larson, Pilat* Fundamental concepts of air pollution. Emission sources, atmospheric dispersion, ambient concentrations, adverse effects, governmental regulations, emission standards, air-quality standards, processes and equipment for controlling emissions. Prerequisite: senior standing. Offered: jointly with ENV H 461; A.

CIVE 491 Deterministic Systems (3) *Mar, Palmer* Development of quantitative methods for mathematical problem solving with emphasis on computer applications. Linear programming, mathematics of the simplex algorithm, sensitivity analysis, dynamic programming, systems simulation, and goal programming. Class project required. Prerequisite: 390 or equivalent or permission of instructor. Offered: A.

CIVE 492 Stochastic Systems (3) *Mar, Palmer* Introduction to probability distributions and statistics useful in systems analysis, conditional distributions, queuing theory and applications. Monte Carlo simulation, chance-constrained mathematical programming,

and stochastic dynamic programming. Emphasis on application of the techniques to civil engineering systems problems, including transportation, water resources, and structures. Prerequisite: 491 or permission of instructor. Offered: W.

CIVE 493 Air-Pollution Source Testing and Equipment Evaluation (3) *Larson, Pilat* Engineering evaluation of air pollutant sources and air control equipment. Air-pollutant source testing and stack sampling. Analysis of equifluence and source emissions in the field and in the laboratory. Prerequisite: senior standing or permission of instructor. Offered: Sp.

CIVE 494 Air-Pollution Control Equipment Design (3) *Pilat* Designs to control air pollutants from stationary sources. Procedures for calculating design and operating parameters. Fundamental mechanisms and processes of gaseous and particulate control equipment for absorption and adsorption of gaseous pollutants; electrostatic precipitation and filtration of particulate pollutants. Actual case studies. Prerequisite: senior standing or permission of instructor. Offered: jointly with CH E/M E 468; W.

CIVE 498 Special Topics (1-5) Special topics in civil engineering offered as course with lecture and/or laboratory. Maximum of 6 credits in combination of 498 and 499 may be applied toward an undergraduate degree. Prerequisites: senior standing in Civil Engineering and permission of instructor. Offered: AWSpS.

CIVE 499 Special Projects (1-5) Individual undergraduate research projects. Maximum of 6 credits in combination of 498 and 499 may be applied toward an undergraduate degree. Prerequisites: any 400-level course, which may be taken concurrently, and permission of instructor. Offered: AWSpS.

Courses for Graduates Only

CIVE 700 Master's Thesis (*) Prerequisite: permission of adviser. Offered: AWSpS.

CIVE 800 Doctoral Dissertation (*) Prerequisite: permission of adviser. Offered: AWSpS.

Transportation, Surveying, and Construction Engineering

CETS 506 Design of Temporary Structures in Construction (3) *Dunston, Hinze* Fundamental criteria to be considered in the design of various temporary structures in construction. Temporary structures include rock crushing plants, belt conveying systems, concrete forms, cellular fill cofferdams, braced cofferdams. Manual and computer-aided design approaches. Prerequisites: 406 which may be taken concurrently, CIVE 454 or equivalent, or permission of instructor. Offered: W.

CETS 508 Construction Administration (3) *Dunston* Conceptual estimating and detailed estimating. Estimating as it applies to labor, materials, equipment, and overhead. Cost control for construction operations. Quality control. Accounting and taxation in construction. Managing project security, subcontractors, submittals, change orders, correspondence, testing, and start-up. Offered: Sp.

CETS 509 Construction Productivity (3) *Hinze* Work improvement techniques applied to construction operations. Review of major contributions in behavioral science that may be applicable to the construction industry. Case studies. Innovative productivity programs successfully implemented on construction projects. Safety on construction projects, especially as influenced by managerial practices. Offered: A.

CETS 511 Traffic Systems Operations (3) *Nihan* Operational planning, management of arterial and freeway traffic systems. Review of transportation system management strategies to achieve more efficient use of existing infrastructure, including improved and innovative traffic control systems and demand management policies, measures of effectiveness, impact

assessment, traveler response. Introduction to use of relevant computer models and packages. Offered: W.

CETS 520 Seminar (1, max. 6) Prerequisite: permission of thesis supervisor. Offered: AW.

CETS 526 Portland Cement Concrete Laboratory (4) *Janssen* The examination of strength, stiffness, and durability properties of conventional and high-performance portland cement concrete mixes through laboratory analysis and classroom lectures. Topics include mix design parameters, the effects of admixtures, methods of testing, and non-destructive analysis. Prerequisites: BSCE with CIVE 363 or CIVE 422 or equivalent. Offered: W.

CETS 541 Transit Systems Planning (3) *Rutherford* Planning, operational methods for urban public transportation. Review of technological, operating characteristics of vehicles and systems; financing, management, institutional aspects. Paratransit. Short-range planning, operational strategies, revenue-fare structures. Service monitoring. Mode choice, transit demand relating to service. Computer-aided methods for planning, design of transit systems. Prerequisite: graduate standing or permission of instructor. Offered: W.

CETS 543 Airport Engineering (3) *Mahoney* Definitions and terminology relating to airport engineering. Characteristics of aircraft, air traffic control, and resulting impact upon design process. Airport capacity, configuration, and planning associated with terminal design. Emphasis on geometric and structural design of pavements and airside. Design projects relating to airport engineering required. Prerequisite: permission of instructor. Offered: Sp.

CETS 571 Analytical Methods in Transportation (3) *Manning* Application of analytical and statistical methods to transportation planning problems. Analysis of probability distributions that describe variables. Development of statistical models for predicting transportation phenomena. Elementary sampling theory hypothesis testing, regression analysis, time series analysis, applied to transportation data. Prerequisite: graduate standing or permission of instructor. Offered: Sp.

CETS 574 Advanced Travel Demand Theory and Applications (3) *Manning* New methods for estimating and forecasting travel demand. Individual as economic, psychological decision-making unit. Theoretical background to models, model structures, model specification, attitudinal measurement, empirical estimation, market segmentation, aggregation issues, model transferability, parameter updating. Practical applications, directions of present and future research. Prerequisite: graduate standing or permission of instructor. Offered: A.

CETS 599 Special Topics: Transportation, Construction, and Geometrics (2-5, max. 15) Prerequisite: permission of instructor. Offered: AWSpS.

CETS 600 Independent Study or Research (*) Prerequisite: permission of adviser. Offered: AWSpS.

Structural and Geotechnical Engineering and Mechanics

CESM 501 Structural Mechanics I—Statics (6) *Elias, Miller, Turkiyyah* Equations of a continuum for small displacements, applications to linear elasticity. Kirchhoff plate theory, problems in advanced strength of materials. Virtual work, minimum potential energy, force and displacement methods of structural analysis. Direct stiffness method. Approximate solutions, geometric stiffness matrix. Linearized buckling. Offered: A.

CESM 502 Structural Mechanics II—Dynamics (3) *Eberhard, MacRae, Reed* Lagrange's equations. Free vibrations of linear, single, and multiple degree of freedom systems. Damping. Mode superposition. Forced vibrations by time history and by re-

sponse spectrum methods. Free and forced vibrations of continuous systems. Wave propagation in rods and beams. Prerequisite: 501. Offered: W.

CESM 503 Materials (3) *Miller, Reed, Roeder* Behavior of materials used in civil engineering structures. Yield and failure surfaces. Physical and phenomenological models of plastic and viscoelastic behavior. Fracture mechanics. Fatigue models and predictions. Damping and friction. Behavior of anisotropic and composite materials.

CESM 504 Finite Element Methods in Structural Mechanics (3) *Elias, Miller, Turkiyyah* Extension of the matrix methods of structural analysis to the solution of elasticity, plate, and shell problems by use of finite element approximations. Discussion of convergence and bounding and extension to investigation of stability and finite deformations. Prerequisite: 501 or permission of instructor. Offered: W.

CESM 511 Advanced Reinforced Concrete Design (3) *Eberhard, MacRae, Stanton* Behavior and design of reinforced concrete members and structures. Members subject to torsion and torsion combined with flexure and shear; members with small shear span/depth ratios, slabs. Offered: A.

CESM 512 Advanced Prestressed Concrete Design (3) *Eberhard, Stanton* Prestress loss. Design of statically indeterminate prestressed concrete structures; continuous beam, frame, and slab structures (cast in place or assembled from precast units). Prerequisite: 453 or equivalent. Offered: Sp.

CESM 513 Advanced Steel Design (3) *MacRae, Roeder* Factors influencing strength and serviceability of steel structures; LRFD limit state design procedures. Use of theories of plasticity and stability in development of design methods and specifications, bolted and welded connections, temperature effects, and effect of different fabrication methods on behavior of structure. Prerequisites: 501, 503. Offered: W.

CESM 514 Design for Earthquakes I (3) *MacRae, Roeder, Stanton* Linear elastic analysis for prediction of structural behavior in earthquakes. Ground-shaking and earthquake mechanism. Factors affecting severity and frequency of shaking. Ductility and multilevel design approach. Response spectra and design codes such as UBC and ATC, and evaluation of rationale for these specifications. Design problem. Prerequisites: 501, 502. Offered: Sp.

CESM 516 Design for Wind (3) *Reed* Wind effects on structures, including atmospheric boundary layer flow, bluff body aerodynamics, structural dynamics, and aeroelasticity; development and use of ANSI standards; estimation of along-wind, across-wind, and torsional response of tall buildings; design strategies for avoiding wind-induced discomfort in humans. Fundamentals of wind-tunnel testing. Prerequisites: 501, 502. Offered: Sp.

CESM 520 Seminar (1, max. 6) Required for doctoral students. Prerequisite: permission of thesis supervisor. Offered: AWSpS.

CESM 521 Continuum Mechanics I (3) *Elias, Miller* General foundation of fundamental concepts of motion, stress, and energy for a continuum. General equations of conservation of mass, momentum, and energy. Linear and nonlinear elastic, viscous, and inelastic materials. Prerequisite: 501. Offered: jointly with A A 575.

CESM 522 Continuum Mechanics II (3) *Elias, Miller* Development of classical and nonclassical constitutive theories relating to real materials. Applications in metals, concrete, ice, wood, rock, soils, and composites. Prerequisite: 521.

CESM 523 Reliability and Design (3) *Reed* Introduction to theory of structural reliability and its application to design procedures in civil engineering, including probability theory; assessment of uncertain-

ties; code specification (first-order, second-moment format) and the related concept of risk and the influence of socioeconomic factors; loads, load combinations, and probabilities of damage.

CESM 524 Random Vibrations of Structures (3) *Reed* Random vibration theory, emphasis on estimation and analysis of dynamic response of civil engineering structures, including probability theory; analysis of stationary random processes in time and frequency domains; statistics of narrow-band processes; modeling of stationary and nonstationary signals, such as wind velocity and earthquake acceleration data. Prerequisites: 501, 502.

CESM 531 Special Structures (3, max. 6) Special topics such as shells; inflated structures, suspended structures, or other specialized forms of civil engineering structures.

CESM 561 Seepage and Consolidation (3) *Holtz, Kramer, Taylor* Confined and unconfined seepage through porous media, flow net solutions, consolidation, settlement, numerical solution of seepage, and consolidation problems. Prerequisite: CIVE 366 or equivalent. Offered: A.

CESM 562 Shear Strength and Slope Stability (3) *Holtz, Kramer, Taylor* Shear strength of cohesive and cohesionless soils and slope stability analysis of natural and man-made slopes. Prerequisite: 561. Offered: A.

CESM 563 Advanced Foundation Engineering (3) *Holtz, Kramer, Taylor* Design of shallow and deep foundations for bearing capacity and settlement. Construction considerations. Prerequisites 562 and 567. Offered: W.

CESM 564 Lateral Earth Pressures and Retaining Structures (3) *Holtz, Kramer* Analysis of groundwater flow and seepage through dams using analytical and numerical techniques. Various one- and two-dimensional methods of analysis of soil slopes under static and seismic conditions. Computer application of stability analysis methods to slope-stability problems. Prerequisite: 437 or equivalent or permission of instructor. Offered: W.

CESM 565 Soil Dynamics (3) *Kramer* Dynamics of discrete systems; dynamics of continuous systems, wave propagation; dynamic soil properties; linear, nonlinear, and equivalent linear ground response analysis; vibrations of footings; construction vibrations; vibration isolation. Offered: W.

CESM 566 Geotechnical Earthquake Engineering (3) *Kramer* Plate tectonics and elastic rebound theory of earthquakes and faults; characterization of ground motions; seismicity; seismic risk analysis; effect of local soil conditions on ground response; development of design ground motions; liquefaction; dynamic lateral earth pressures; seismic slope stability. Prerequisite: 565 or permission of instructor. Offered: Sp.

CESM 567 Advanced Geotechnical Laboratory (4) *Holtz, Kramer, Taylor* Soil and site investigation, classification and engineering properties of soils and rock as determined by standard and advanced test procedures and equipment. Evaluation of test data. Report writing. Prerequisite: CIVE 366 or equivalent. Offered: A.

CESM 568 Geosynthetic Engineering (3) *Holtz* Identification and testing of geosynthetics. Design of geosynthetic filters, roadway stabilization, earth reinforcement, and waste containment systems. Prerequisite: 562 and 563. Offered: Sp.

CESM 569 Foundation Soil Improvement (3) *Holtz* Analysis and design of physical and chemical treatment techniques commonly applied to problem foundation soils for civil engineering structure. Prerequisite: 563. Offered: Sp.

CESM 570 Engineering Geology II (3) *Taylor* Application of engineering geology fundamentals to: location, design and maintenance of engineered structures; policy decisions related to potential geological hazards. Case histories, governmental policy discussions, interpretation of geological maps for engineering purposes. Prerequisite graduate standing and CIVE 437 or permission of instructor. Offered: Sp.

CESM 571 Rock Engineering (3) *Taylor* Engineering classification, physical and mechanical properties of rocks, failure modes and initial stresses in rocks, laboratory and field testing of rocks, rock slope engineering, underground openings, foundations on rocks. Prerequisite: graduate standing and CIVE 366 or permission of instructor.

CESM 599 Special Topics: Structures and Mechanics (2-5, max. 15) Prerequisites: permission of instructor. Offered: AWSpS.

CESM 600 Independent Study or Research (*) Prerequisite: permission of adviser. Offered: AWSpS.

Environmental Engineering and Science

CEWA 518 Microbial Degradation of Toxic Contaminants (3) *Herwig, Stensel, Strand* Detailed survey of current understanding of microbiology and degradative pathways of industrial organic compounds, pesticides, plastics, oil, and metals. Microbial requirements for bioremediation. Methods of scientific investigation of microbial transformations. Requires basic understanding of metabolism and organic chemistry. Prerequisite: biological science course. Offered: jointly with ESC/MICROM 518; Sp.

CEWA 520 Seminar (1, max. 6) Required of all graduate students in Environmental and Engineering Science each quarter. Credit/no credit only. Offered: AWSpS.

CEWA 525 Seminar—Topics in Atmospheric Chemistry (1-3, max. 6) *Charlson, Harrison* Seminar for atmospheric scientists, chemists, engineers in problems associated with the chemical composition of the atmosphere. Covers wide variety of topics, ranging from the natural system to urban pollution and global atmospheric change. Faculty lectures, student participation. Prerequisite: ATM S 301 or permission of instructor. Offered: jointly with ATM S 525.

CEWA 540 Hydrodynamics (4) *Petroff, Yeh* Applications of the equations of motion to the flow of ideal and real fluids. Fundamentals of fluid potential motion. Viscous flows; Navier-Stokes equations and some exact solutions. Boundary-layer theory. Introduction to turbulence. Two- and three-dimensional examples, including free surface flows. Applications of field equations to problems of engineering significance. Prerequisite: CIVE 342 or equivalent. Offered: A.

CEWA 541 Hydrodynamics in Water Quality (3) *Petroff* Theoretical, field study, and laboratory model approaches to diffusion in transport problems of concern to water resources engineers. Prerequisite: CIVE 342 or permission of instructor. Offered: Sp.

CEWA 544 Water Wave Mechanics (3) *Yeh* Theory of water waves. Classical water wave problem and approximate solution techniques. Evolution equations for and their solutions wave systems. Viscous damping effects and mass transport. Nonlinear shallow-water waves and the Korteweg-deVries equation. Waves on beaches. Recommended: graduate-level course in fluid mechanics. Offered: jointly with AMATH 544; W.

CEWA 545 Advanced Computational Hydraulics (4) *Yeh* Review of hydrodynamic and transport equations for hydraulic engineering application; numerical solution methods; implementation and practice with existing two- and three-dimensional numerical

models; numerical model calibration and verification techniques; case studies. Theoretical and civil engineering decision makers aspects. Prerequisites: 474, 540, 541 or permission of instructor.

CEWA 547 Advanced Hydrology (3) *Burges* Detailed treatment of statistical methods used in hydrologic analysis. Stochastic hydrology, detailed examination and use of a deterministic watershed model (e.g., Stanford Watershed Model). Prerequisite: graduate standing in civil engineering or permission of instructor. Offered: W.

CEWA 548 Groundwater Transport Modeling (3) *Massmann* Review of equations for flow and transport in porous media; techniques for simulating transport as boundary value problems; analytical and numerical solution techniques; finite element models; field-scale applications and case histories. Offered: Sp.

CEWA 550 Microbiological Process Fundamentals (3) *Ferguson, Stensel* Fundamental concepts for microbial processes including organic chemical structure, nomenclature and environmental properties, principles of microbial metabolism, study of specific types of bacteria important to environmental engineering and their metabolism and development of microbial kinetic equations including substrate utilization, energetics, and stoichiometry. Prerequisite: permission of instructor. Offered: A.

CEWA 551 Biological Treatment Systems (3) *Stensel* Basic reactions, design principles, models, and operational considerations for biological treatment systems in environmental engineering. Applications include activated sludge, bulking sludge control, fixed film reactors, nitrification, nitrogen removal, phosphorus removal, anaerobic treatment, and toxic organics removal. Prerequisite: 550. Offered: W.

CEWA 552 Physical-Chemical Treatment Processes (4) *Benjamin* Principles and design of major physical-chemical unit processes used in water, wastewater, and hazardous waste treatment. Processes include chemical and reactor kinetics, filtration, chemical coagulation, ion exchange, adsorption, and gas transfer. Development of mathematical models, laboratory demonstrations, and evaluation of current design practice. Prerequisite: 485 or permission of instructor. Offered: W.

CEWA 553 Topics in Ecological Effects of Wastewater (3) *Welch* Application of ecological concepts for analysis and interpretation of bioenvironmental problems and data (eutrophication, acid rain, and toxicity). Students participate in presentation and discussion of current research. Prerequisite: 462 or BIOL 473 or permission of instructor. Offered: W.

CEWA 554 Advanced Topics in Environmental Engineering, Chemistry, and Biology (3) *Benjamin, Ferguson* Special topics of current importance in environmental engineering. Application of fundamental chemical and biological principles to the study of such phenomena as the behavior of aqueous colloids, corrosion processes, bacterial metabolism in chemically complex solutions, and acid precipitation. May be taken more than once for credit. Prerequisites: 550, 551. Offered: W.

CEWA 555 Lake Management (2) *Welch* Application of recognized techniques/approaches to restore and manage eutrophic lakes. Includes critiques of restoration proposals. Credit/no credit only. Prerequisites: CIVE 462/FISH 434, BIOL 473, or permission of instructor. Offered: A.

CEWA 556 Industrial Waste Treatment (3) *Benjamin, Ferguson, Stensel* Survey of laws and regulations governing industrial waste discharge. Sources, amounts, and characteristics of wastes from various industries. Specialized treatment processes, case studies, and site visits. Prerequisite: 550 or 551 or permission of instructor.

CEWA 557 Water Resources Management (3) *Mar, Palmer* Engineering, social, and economic factors involved in water resource development and management; water policies, programs, and administration; use relationships and conflicts; considerations for regional water resource systems. Offered: W.

CEWA 558 Water-Quality Management (3) *Mar, Palmer* Application of biological, ecological, and chemical processes to modeling of water quality and use of such models in appropriate management of water resource systems. Includes units on the modeling of temperature, BOD, nutrient, phytoplankton, zooplankton, and other processes in lakes, streams, and estuaries. Recommended: 476, 485, CIVE 462/ FISH 434, and CIVE 491. Offered: Sp.

CEWA 559 Water Resources System Management (3) *Burges, Mar, Palmer* A readings course in recent literature related to the modeling and management of water resources. Topics include drought management, expansion of existing water supplies, hydro-power production, streamflow forecasting, water demand forecasting, regional water planning, climate change, and other topical issues. Recommended: 557, 558. Offered: A.

CEWA 560 Topics in Environmental Health (3) *Larson* Introduction to human biology, including physiology, epidemiology, and toxicology. Study of contemporary environmental health problems and practices as they relate to radiological health, solid-waste disposal, occupational health, biometeorology, and bioengineering.

CEWA 562 Hazardous Air Pollution (3) *Pilat* Control of emissions of hazardous or toxic air pollutants. Government regulations, determination of needed control efficiency. Emission control by thermal incineration, catalytic incineration, flares, condensation, carbon adsorption, and absorption (wet and dry). Hazardous waste incinerators. Case studies. Offered: jointly with CHEM E 562; W.

CEWA 563 Air Resources Management (3) *Larson, Pilat* Technical, administrative, and legal aspects of air conservation. Current case studies involving engineering analysis, air-quality modeling, and regulatory aspects at local, state, and federal governmental levels. Offered: A.

CEWA 566 Control of Gaseous Air Pollutants (3) *Larson, Pilat* Physical and chemical processes used to control gaseous air pollutants. Absorption into liquids. Aqueous spray dryer scrubbers. Adsorption beds. Control of sulfur oxide and nitrogen oxide. Case studies of control systems. Prerequisite: 468 or CHEM E 435 or permission of instructor. Offered: jointly with CHEM E 566; even years.

CEWA 567 Control of Particulate Air Pollutants (3) *Larson, Pilat* Processes used to control emissions of particulate air pollutants. Use of settling chambers, cyclones, fabric filters, wet scrubbers, and electrostatic precipitators to control aerosol particles. Case studies of particulate air-pollutant control systems. Prerequisite: 468 or permission of instructor. Offered: jointly with CHEM E 567; odd years; Sp.

CEWA 577 Risk Assessment for Environmental Health Hazards (3/4) *Faustman, Omenn* Examines context, methodologies, data, uncertainties, and institutional arrangements for risk assessment. Qualitative and quantitative approaches to identification, characterization, and control of environmental hazards to health emphasized through didactic and case studies. Offered: jointly with ENV H/PB AF 577; A.

CEWA 599 Special Topics: Water and Air Resources (2-5, max. 15) Prerequisite: permission of instructor. Offered: AWSpS.

CEWA 600 Independent Study or Research (*) Prerequisite: permission of adviser. Offered: AWSpS.

Computer Science and Engineering

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A Bachelor of Science in Computer Engineering degree is offered by the department of Computer Science and Engineering, and is administered through the College of Engineering. The department also offers a Bachelor of Science degree in computer science administered through the College of Arts and Sciences. Information concerning the B.S. degree in computer science can be found under Computer Science in the College of Arts and Sciences section of this catalog.

Computer science is the study of information and algorithms within the context of real and abstract computing devices. Computer scientists are interested in such topics as the representation and storage of information, algorithms to access, display, edit, and transform information, programming languages to express algorithms, and hardware and software processors to execute algorithms. These concerns lead to practical developments in computer systems software and in application areas such as artificial intelligence, computer graphics, and databases, and to theoretical investigations of computers, algorithms, and data.

Computer engineering is a closely related field that concerns itself with the design and practical application of computer hardware and software systems to the solution of technological, economic, and societal problems. The computer engineer analyzes a problem and selects from a variety of tools those most appropriate for its solution. A computer engineer can expect to be involved in hardware design, software creation and systems integration. The program provides an in-depth education in computer engineering while retaining strong foundations in traditional electrical engineering and computer science. The computer engineering program involves digital hardware, software, and architecture. Mathematics, engineering design, laboratory work, and communication skills development are emphasized. A course including a project must be completed during the senior year.

The computer science major is more appropriate for students who want to have a double major with another College of Arts and Sciences program (for example, mathematics or economics), who want the additional flexibility of the computer science requirements (the computer engineering major has more required courses and fewer electives), or who are more interested in software systems and computation than in hardware. The computer engineering major is more appropriate for students who are interested in building systems that include both custom hardware and software components, who have strong interests in electrical engineering, or who specifically want an engineering degree.

Instructional and Special Research Facilities

The Computer Science Laboratory provides powerful, state-of-the-art facilities for undergraduate, graduate, and faculty instruction and research. The equipment base is upgraded frequently; for an up-to-date description please see the descriptions in the online undergraduate and graduate brochures, available via the department's web page.

For undergraduate instruction, a laboratory containing 24 Intel Pentium PCs running Microsoft Windows NT supports programming language, database, and other courses. For general undergraduate computing, another lab contains approximately 40 X terminals, backed by three DECstation 5000s running Unix. To support digital system design courses, the department operates a design laboratory consisting of Pentium, 486, and Macintosh systems, along with Tektronix logic analyzers and other test equipment. The computer

graphics instructional laboratory contains 14 Silicon Graphics Indy color graphics workstations, and a collection of specialized video gear, while the Laboratory for Animation Arts includes 10 SGI Indigo2 Extreme color graphics workstations. Students working on senior and honors projects often make use of more advanced equipment in the department as well.

For graduate instruction and research, general-purpose research computing is provided by 230 Unix-based workstations, located in graduate student and faculty offices and in research laboratories. These workstations include Intel Pentiums, SGI Indy workstations, IBM PowerPC workstations, SPARCstations, and DECstations and DEC AlphaStations. For research in parallel computing, the Laboratory operates a 16-node Intel Paragon and a MasPar MP-1101B data-parallel machine. Research in computer systems involves a wide and constantly updated variety of hardware, software, and networks. (Current hardware includes DEC Alpha, SGI R4000, HP/PA, DECstation/MIPS, and IBM PowerPC uniprocessor platforms.) Research in VLSI, digital hardware, and embedded systems is supported by a set of SPARC and DEC Alpha workstations, multi-processor compute servers, and a variety of X terminals, Macintoshes and PCs. A large collection of both commercial and University computer-aided design tools form the core of the design environment providing capabilities for the design of CMOS VLSI chips, various forms of programmable logic and microprocessor-based systems, and printed-circuit boards. A variety of specialized equipment for the prototyping, debugging, and testing of microelectronic systems is also available and is housed within the Laboratory for Integrated Systems. Research in graphics, image processing, and user interfaces, centered in the Graphics and Imaging Laboratory utilizes a collection of SGI 3-D graphics workstations, along with various special-purpose devices, including a Tektronix dye-sublimation color printer, a color scanner, and film recording and video editing gear.

The department's local network includes a number of ethernet and an ATM network, all interconnected by bridges and routers. Convenient access is provided to the Internet. Dialup access is available to virtually all departmental computing equipment.

Undergraduate Programs

Bachelor of Science

See Computer Science in the College of Arts and Sciences section of this catalog.

Bachelor of Science in Computer Engineering

114 Sieg

Admission Requirements: Because resources are limited, students must apply for admission to the computer engineering program. Application forms and a comprehensive booklet, *The Computer Engineering Handbook for Undergraduates*, can be obtained from the receptionist in the main office, 114 Sieg. The Handbook is also available via the department's web page. The department classifies applicants by admission group; the specific requirements for each are described below.

(1) Early Admission Group (EAG): Open to students enrolled at the UW. Applicants must have completed 15 credits of mathematics at the level of MATH 124, 125, 126 or equivalent; 10 credits of laboratory physical sciences at the level of PHYS 121/131, 122/132, 123/133 or CHEM 140, 141, 150, 151, or equivalent; and 5 credits of English composition. At least 15 of these 30 credits must be completed at the UW prior to application. In addition to the College of Engineering requirements above, the department requires the completion of CSE/ENGR 142. Admission is for autumn quarter only; the application deadline is given in the departmental handbook.

(2) Upper-Division Admission Group (UAG): Students must have completed 64 credits applicable to the degree, including MATH 124, 125, 126, 307; PHYS 121/131, 122/132, 123/133; CHEM 140, 141; CSE/ENGR 142; and at least 5 credits of English composition. Admission is for autumn or spring quarter; application deadlines are given in the departmental handbook.

Graduation Requirements (in addition to the General Education requirements of the College of Engineering as specified above): (1) Computer Engineering Required Courses (63 credits): CSE/ENGR 142; CSE 143; ENGR 215; CSE 321, 326, 341, 370, 378, 451, 467, 471, 477; E E 233, 331, 332. (2) Computer Engineering Elective Component (17 credits): Selected from the approved list of computer engineering electives in the undergraduate handbook. (3) Engineering, Mathematics, and Science Electives (8 credits): Selected from any graded ENGR course, any graded course at the 300 level and above in an engineering department or in a science department (selected from the approved list in the computer engineering handbook), BIOL 200, CHEM 160, CHEM 161, E E 235, CSE 135.

To graduate, a student must earn a total of 180 credits with a grade of at least 2.0 in all required or elective computer engineering courses taken. The engineering design credits must total at least 26, while the engineering science credits must total at least 50. For a complete description of the current requirements, please consult the undergraduate handbook.

Graduate Program

Carl Ebeling, Graduate Program Coordinator

The Department of Computer Science and Engineering offers programs of study leading to the degrees of Master of Science and Doctor of Philosophy. Individual programs can be designed to provide considerable breadth of knowledge, as well as depth in an area of specialization. An M.S. degree can usually be completed in one to two years, and a Ph.D. degree can be completed in four to five years. It is not necessary to complete an M.S. program before entering the Ph.D. program. Degree requirements are outlined in *The Computer Science and Engineering Graduate Program Brochure*, available from the department.

The department has 32 faculty members with appointments in Computer Science and Engineering and 24 adjunct, affiliate, and emeritus faculty members. Research opportunities exist for graduate students in the following ongoing projects and in other areas: VLSI, computer-aided design, computer architecture, operating systems, networks, programming environments, parallel and distributed computing, programming languages, compilers, software engineering, artificial intelligence, image analysis, computer graphics, computer vision, computational complexity, analysis of algorithms, and computational molecular biology.

Application Requirements

Most entering graduate students are expected to have a solid background in computer science, including programming, machine organization, data structures, discrete mathematics, automata theory, and programming systems (e.g., the equivalent of 378, 326, 321, 322, and either 401 or 451). Some exceptions to these requirements are made for otherwise-promising students. Graduate Record Examination scores are required; GRE subject test score (not necessarily in computer science) is recommended. Scores should be earned within the preceding five years. *The Computer Science and Engineering Graduate Program Brochure* gives full details of application procedures.

Complete applications must be received by January 10 for autumn quarter admission.

Assistantships

Some research assistantships are available in the Computer Science Laboratory and through research grants. Teaching assistantships are also available. In general, this support is allocated on the basis of scholastic excellence and potential. Students who are applying for assistantships to start in autumn quarter should have all applications to the Graduate School and the department completed by January 10.

The application packet contains all the necessary forms for applying to the Graduate School and to the Graduate Program in Computer Science and Engineering and for consideration for assistantships.

Correspondence and Information

Graduate Program Coordinator
Department of Computer Science and Engineering,
Box 352350

Faculty

Chair

Edward D. Lazowska

Professors

Atlas, Les Eugene * 1983, (Adjunct); MS, 1978, University of Wisconsin; PhD, 1983, Stanford University; time-frequency representations, digital signal processing applied to speech, audio, manufacturing.

Baer, Jean-Loup * 1969; MS, 1963, Grenoble; PhD, 1968, University of California (Los Angeles); parallel processing, computer architecture.

Borning, Alan H. * 1980; PhD, 1979, Stanford University; programming languages and environments, user interfaces, computers and society.

De Rose, Anthony David * 1985, (Affiliate); PhD, 1985, University of California (Berkeley); computer-aided geometric design and modeling, graphical user interfaces, high resolution graphics.

Duchamp, Thomas E. * 1976, (Adjunct); PhD, 1976, University of Illinois; differential geometry, computer graphics.

Golde, Hellmut * 1959, (Emeritus); PhD, 1959, Stanford University; computer networks, compilers.

Haralick, Robert M. * 1986, (Adjunct); PhD, 1969, University of Kansas; computer vision, artificial intelligence, pattern recognition, image processing.

Holden, Alistair D. * 1958; PhD, 1964, University of Washington; artificial intelligence and applications, speech understanding, neural networks.

Hunt, Earl B. * 1966, (Adjunct); PhD, 1960, Yale University; human and artificial intelligence, computer applications in teaching.

Kalonji, Gretchen * 1990, (Adjunct); PhD, 1982, Massachusetts Institute of Technology; crystalline defects, computer simulation, rapid solidification of ceramics.

Karp, Richard Manning 1995; PhD, 1959, Harvard University; combinatorial algorithms, computational complexity, parallel algorithms, computational biology.

Kehl, Theodore 1961; PhD, 1961, University of Wisconsin; real-time hardware and software systems, computer design, VLSI.

Kim, Yongmin * 1982, (Adjunct); PhD, 1982, University of Wisconsin; computer architecture, imaging systems, computer graphics, multimedia, modeling and instrumentation.

Klee, Victor * 1953, (Adjunct); PhD, 1949, University of Virginia; convex sets, functional analysis, analysis of algorithms, optimization, combinatorics.

Ladner, Richard E. * 1971; PhD, 1971, University of California (Berkeley); distributed and parallel comput-

ing theory, computational complexity, computers to aid the disabled.

Lazowska, Edward D. * 1977; PhD, 1977, University of Toronto (Canada); computer systems: modeling and analysis, design and implementation, distributed and parallel systems.

Leveson, Nancy G. * 1992; PhD, 1980, University of California (Los Angeles); software engineering, software and system safety, software reliability and fault tolerance.

Levy, Henry M. * 1983; MS, 1981, University of Washington; computer architecture, operating systems, distributed and parallel systems, object-oriented systems.

MacKay, Pierre A. * 1966, (Adjunct); PhD, 1964, University of California (Berkeley); Greek literature, post-classical and Byzantine Greek literature, numismatics.

Noe, Jerre D. * 1968, (Emeritus); PhD, 1948, Stanford University; distributed computer systems, computer measurement and evaluation, simulation.

Notkin, David S. * 1984; PhD, 1984, Carnegie-Mellon University; software engineering, evolution, environments, and systems; parallel systems and environments.

Ruzzo, Walter L. * 1977; PhD, 1978, University of California (Berkeley); computational complexity, parallel computation, computational biology.

Shapiro, Linda G. * 1986; PhD, 1974, University of Iowa; computer vision, artificial intelligence, pattern recognition, robotics.

Shaw, Alan Cary * 1971; PhD, 1968, Stanford University; operating systems, software specifications, real-time systems.

Snyder, Lawrence * 1983; PhD, 1973, Carnegie-Mellon University; the theory, algorithms, languages, architecture, and VLSI issues of parallel computation.

Somani, Arun Kumar * 1986; PhD, 1985, McGill University (Canada); parallel computer systems architecture, fault-tolerant computing, interconnection networks.

Stuetzle, Werner * 1984, (Adjunct); PhD, 1977, Swiss Federal Institute of Technology; nonparametric methods in multivariate analysis, statistical applications of computer graphics.

Tanimoto, Steven L. * 1977; PhD, 1975, Princeton University; image analysis, artificial intelligence, computer graphics, educational technology.

Tompkins, Martin * 1978; PhD, 1978, University of Toronto (Canada); computational complexity, computational biology.

Young, Paul R. * 1983; PhD, 1963, Massachusetts Institute of Technology; computational complexity, computability, connections with mathematical logic.

Zahorjan, John * 1980; PhD, 1980, University of Toronto (Canada); computer systems, performance analysis, parallel programming models, scheduling and runtime support.

Zick, Gregory L. * 1974, (Adjunct); PhD, 1974, University of Michigan; image and multimedia databases, medical imaging.

Associate Professors

Adams, Loyce M. * 1985, (Adjunct); PhD, 1983, University of Virginia; numerical algorithms for parallel computers.

Anderson, Richard J. * 1986; PhD, 1985, Stanford University; parallel algorithms, computational geometry, combinatorial optimization.

Beame, Paul W. * 1987; PhD, 1987, University of Toronto (Canada); computational complexity, parallel computation, circuit-based complexity.

Borriello, Gaetano * 1988; PhD, 1988, University of California (Berkeley); computer-aided design and synthesis of digital circuits, special purpose architectures.

Brinkley, James F. III * 1988, (Adjunct Research); MD, 1974, University of Washington; PhD, 1984, Stanford University; computer applications in medicine and biology.

Dekker, David B. 1948, (Emeritus); PhD, 1948, University of California (Berkeley); numerical analysis, curve fitting, numerical solutions of differential equations.

Ebeling, William H. C. * 1986; PhD, 1986, Carnegie-Mellon University; computer-aided design, VLSI architectures.

Eggers, Susan Jane * 1989; PhD, 1989, University of California (Berkeley); compiler-directed parallelization, code and thread scheduling, trace driven methodology.

Hanks, Steven John * 1989; PhD, 1990, Yale University; planning, reasoning, decision making under uncertainty, logic for artificial intelligence.

Kalet, Ira J. * 1980, (Adjunct); PhD, 1968, Princeton University; computer simulation of radiation therapy, artificial intelligence, computer graphics.

McDonald, John A. * 1985, (Adjunct Research); PhD, 1982, Stanford University; scientific computing, computer aided language learning, computer processing of Asian languages.

Riskin, Eve A. * 1990, (Adjunct); PhD, 1990, Stanford University; image compression and processing, and signal processing.

Weld, Daniel Sabey * 1988; PhD, 1988, Massachusetts Institute of Technology; artificial intelligence, planning, model based reasoning.

Assistant Professors

Bershad, Brian * 1993; PhD, 1990, University of Washington; operating systems, architecture, distributed systems, parallel systems.

Burns, Steven M. * 1991; PhD, 1991, California Institute of Technology; VLSI, asynchronous circuit design, CAD, concurrent computation.

Chambers, Craig D. * 1991; PhD, 1992, Stanford University; object-oriented language design and implementation.

Etzioni, Oren * 1991; PhD, 1990, Carnegie-Mellon University; artificial intelligence, machine learning, integrated architectures, planning.

Salesin, David Henry * 1991; PhD, 1991, Stanford University; computer graphics, user interfaces, computational geometry.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

CSE 135 Computational Techniques (4) NW/QSR Principles of computation and techniques for using the computer as a tool in science and engineering. Basic programming techniques (conditionals, iteration, procedural, and data abstraction). Introduction to simulation, visualization, and symbolic mathematics. Solving engineering and science problems using programmable tools rather than conventional programming languages. Prerequisites: Math 124.

CSE 142 Computer Programming for Engineers and Scientists I (4) NW/QSR Basic programming-in-the-small abilities and concepts. Highlights include procedural and functional abstraction with simple built-in data type manipulation. Basic abilities of writing, executing, and debugging programs. Not available for credit to students who have completed 210 or ENGR 141. Offered: jointly with ENGR 142; AWSPs.

CSE 143 Computer Programming for Engineers and Scientists II (5) NW, QSR Topics include analyzing algorithms; using/writing standard software

components (queues, stacks, tables) implemented by private types, generic packages, and dynamic data structures (lists and trees); recursive data- and control structures. Last two weeks survey computer science topics. Not available for credit to students who have completed CSE 211. Prerequisite: CSE/ENGR 142. Offered: AWSPs.

210 and 211, which are no longer offered, may be used as prerequisites in place of CSE/ENGR 142 and CSE 143 respectively.

Courses for Nonmajors

The following courses are intended to give a technical introduction to fundamental topics in computer science to non-computer science majors who are likely to use computers as tools in their own disciplines.

CSE 373 Data Structures and Algorithms (3) Fundamental algorithms and data structures for implementation. Techniques for solving problems by programming. Linked lists, stacks, queues, directed graphs. Trees: representations, traversals. Searching (hashing, binary search trees, multiway trees). Garbage collection, memory management. Internal and external sorting. Not open for credit to students who have completed 326, 374, or E E 374. Prerequisite: 143.

CSE 410 Computer Systems (3) Structure and components of hardware and software systems. Machine organization, including central processor and input-output architectures; assembly language programming; operating systems, including process, storage, and file management. Not open for credit to students who have completed 378 or 451. Prerequisite: 373.

CSE 413 Programming Languages and Their Implementation (3) Concepts and implementation strategies for ALGOL-class languages, including Pascal, Modula, ALGOL 60, Ada. Compilers for ALGOL-class languages. Languages with late binding times, including LISP, APL, Smalltalk. Not open for credit to students who have completed 341 or 401. Prerequisite: 373.

CSE 415 Introduction to Artificial Intelligence (5) NW Principles and programming techniques of artificial intelligence: LISP, symbol manipulation, knowledge representation, logical and probabilistic reasoning, learning, language understanding, vision, expert systems, and social issues. Not open for credit to students who have completed 473. Prerequisites: 373 or 143 and permission of instructor.

Courses for Majors

CSE 321 Discrete Structures (4) Fundamentals of set theory, graph theory, enumeration, and algebraic structures, with applications in computing. Prerequisites: 143 and MATH 126. Offered: AWSP.

CSE 322 Introduction to Formal Models in Computer Science (3) Finite automata and regular expressions; context-free grammars and pushdown automata; nondeterminism; Turing machines and the halting problem. Emphasis on understanding models and their applications and on rigorous use of basic techniques of analysis. Induction proofs, simulation, diagonalization, and reduction arguments. Prerequisite: 321. Offered: AW.

CSE 326 Data Structures (4) Data types, abstract data types, and data structures. Efficiency of algorithms. Sequential and linked implementation of lists. Binary tree representations and traversals. Searching: dictionaries, priority queues, hashing. Directed graphs, depth-first algorithms. Garbage collection. Dynamic storage allocation. Internal and external sorting. Not open for credit to students who have completed 373, 374, or E E 374. Prerequisite: 321. Offered: AWSP.

CSE 341 Programming Languages (5) Designed to make the student reasonably fluent in several rad-

cally different languages, such as LISP, PROLOG, and Smalltalk. Not open for credit to students who have completed 413. Prerequisite: 143. Offered: AWSP.

CSE 370 Introduction to Digital Design (3) Introductory course in digital logic and its specification and simulation. Boolean algebra, combinational circuits including arithmetic circuits and regular structures, sequential circuits including finite-state-machines, use of programmable logic devices. Simulation and high-level specification techniques are emphasized. Offered: AWSP.

CSE 378 Machine Organization and Assembly Language (4) Differences and similarities in machine organization. Central processors. Fundamentals of machine language and addressing. Assembly language programming, including macros. Operating system interfaces. Not open for credit to students who have completed 410. Prerequisite: CSE 143. Offered: AWSP.

CSE 401 Introduction to Compiler Construction (3) Fundamentals of compilers and interpreters for symbol tables; lexical analysis, syntax analysis, semantic analysis, code generation, and optimizations for general purpose programming languages. Prerequisites: 326, 341, and 378.

CSE 403 Software Engineering (4) Fundamentals of software engineering using a group project as the basic vehicle. Topics covered include the software crisis, managing complexity, requirements specification, architectural and detailed design, testing and analysis, software process, and tools and environments. Recommended: 401 or 451. Prerequisite: 321, 341, and 378.

CSE 421 Introduction to Algorithms (3) Techniques for design and analysis of efficient algorithms. Methods for showing lower bounds on computational complexity. Particular algorithms for sorting, searching, set manipulation, arithmetic, graph problems, pattern matching. Prerequisites: 322, 326.

CSE 431 Introduction to Theory of Computation (3) Models of computation, computable and non-computable functions, space and time complexity, tractable and intractable functions. Prerequisite: 322.

CSE 444 Introduction to Data-base Systems (3) Fundamental concepts, system organization, and implementation of data-base systems. Relational, hierarchical, and network data models; file organizations and data structures; query languages; query optimization; data-base design; concurrency control; security; issues involving distributed data-base systems. Prerequisite: 326.

CSE 451 Introduction to Operating Systems (4) Principles of operating systems. Process management, memory management, auxiliary storage management, resource allocation. Not open for credit to students who have completed 410 or E E 474. Prerequisites: 326, 378.

CSE 457 Computer Graphics (3) Techniques of computer image synthesis, including both hardware and software. Line drawing and color raster graphics. Homogeneous coordinates, hidden surface, and smooth shading algorithms. Prerequisite: 326.

CSE 461 Introduction to Computer-Communication Networks (3) Computer network architectures, protocol layers. Transmission media, encoding systems, error detection, multiplexing, switching. Data link, multiple access channel protocols. Methods for network routing, congestion control, flow control. End-to-end transport services, protocols. Network security, privacy. Applications including electronic mail, virtual terminals, distributed operating systems. Prerequisite: senior standing. Offered: jointly with E E 461.

CSE 467 Advanced Digital Design (3) Advanced techniques in the design of digital systems. Hardware description languages, combinational and sequential

logic synthesis and optimization methods, partitioning, mapping to regular structures. Emphasis on reconfigurable logic as an implementation medium. Memory system design. Digital communication including serial/parallel and synchronous/asynchronous methods. Prerequisites: 326 and 370.

CSE 471 Computer Design and Organization (4) CPU instruction set and addressing modes, CPU structure and functions, computer arithmetic and logic unit, register transfer level design, hardware and microprogram control, memory hierarchy design and organization, I/O, and system components interconnection. Laboratory project involves design and simulation of an instruction set processor. Prerequisites: 370 and 378.

CSE 472 Introduction to Computational Linguistics (3) Introduction to computer applications of linguistic theory, including syntactic processing, semantic, and pragmatic interpretation and natural language generation. Prerequisite: LING 471 or permission of instructor. Offered: jointly with LING 472.

CSE 473 Introduction to Artificial Intelligence (3) Principal ideas and developments in artificial intelligence: theorem proving, problem-solving methods, representation of knowledge, natural language analysis and synthesis, programming languages for artificial intelligence. Not open for credit to students who have completed 415. Prerequisite: 326; recommended: 341.

CSE 477 Digital System Design (4) Students use laboratory to design, simulate, construct, and debug a substantial project that includes hardware, software, and communication components. Lectures focus on use of embedded processors in digital system design and interfacing techniques. Writing and debugging of real-time reactive software emphasized. Prerequisites: 378 and 467.

CSE 490 Special Topics in Computer Science and Engineering (1-5) Lectures, discussions, and possibly labs on topics of current interest in computer science and engineering not covered by other CSE undergraduate courses. Prerequisite: senior standing in Computer Science or Computer Engineering. Offered: AWSpS.

CSE 498- Senior Project ((1-9)-) A report (and perhaps demonstration) describing a development, survey, or small research project in computer science or an application to another field. Objectives are: (1) integrating material from several courses, (2) introducing the professional literature, (3) gaining experience in writing a technical document, and (4) showing evidence of independent work. Work normally extends over more than one quarter, for a maximum of 6 credits for 498-; 9 credits are required for 498H-. Prerequisite: senior standing and permission of instructor. Offered: AWSpS.

CSE 499 Reading and Research (1-24) Available in special situations for advanced computer science majors to do reading and research in field, subject to approval of undergraduate adviser and CSE faculty member. Free elective, but does not replace core course or computer science elective. Prerequisites: senior standing and permission of instructor. Credit/no credit only. Offered: AWSpS.

Courses for Graduates Only

All graduate courses are primarily for computer science graduate students. Others must petition for entry codes.

CSE 500 Computers and Society (2) Study of impact of computer technology on present and future society, including political, economic, cultural, social, and moral issues. Includes guest lecturers and discussion leaders. Each student is required to complete a term project. Prerequisite: graduate standing in computer science or permission of instructor. Credit/no credit only. Offered: alternate years.

CSE 501 Implementation of Programming Languages (3) Design of compilers and run-time systems for traditional and non-traditional programming languages. Intra- and interprocedural analyses and optimization. Compile-time and run-time implementation techniques for LISP-like, functional, and object-oriented languages. Students construct an optimizing compiler. Prerequisites: CSE major and 401 and 505.

CSE 503 Software Engineering (3) Specification, implementation, and testing of large, multiperson, software systems. Topics include abstraction, information hiding, software development environments, and formal specifications. Prerequisites: CSE major and 322, 326, and 378 or equivalents.

CSE 504 Advanced Topic in Software Engineering (3) Topics vary but may include software design and evolution, formal methods, requirements specifications, software and system safety, reverse engineering, real-time software, metrics and measurement, programming environments, and verification and validation.

CSE 505 Concepts of Programming Languages (3) Data structures, types, control structures. Languages in the ALGOL family; functional, object-oriented, and logic programming languages. Prerequisites: CSE major, 401 and a working knowledge of Pascal and LISP.

CSE 506 Advanced Topics in Programming Languages (3) May include functional; object-oriented, parallel, and logic programming languages; semantics for languages of these kinds; type declaration, inference, and checking (including polymorphic types); implementation issues, such as compilation, lazy evaluation, combinators, parallelism, various optimization techniques. Implementation project required. Prerequisites: CSE major, 501 which may be taken concurrently, and 505. Offered: alternate years.

CSE 519 Computer Science Research Seminar (1, max. 3) Weekly presentations on current research activities by members of the department. Only computer science graduate students may register, although others are encouraged to attend. Credit/no credit only. Offered: AWSp.

CSE 520 Computer Science Colloquium (1, max. 9) Weekly public presentations on topics of current interest by visiting computer scientists. Credit/no credit only. Offered: AWSp.

CSE 521 Design and Analysis of Algorithms I (3) Principles of design of efficient algorithms: recursion, divide and conquer, balancing, dynamic programming, greedy method, data structure selection. Correctness and analysis of algorithms. Examples drawn from problems in sorting, searching, set manipulation, pattern matching, graphs, matrices, polynomials, and integers. Prerequisite: CSE major and 326 or equivalent.

CSE 522 Design and Analysis of Algorithms II (3) Analysis of algorithms more sophisticated than those treated in 521. Content varies and may include such topics as algebraic algorithms, combinational algorithms, techniques for proving lower bounds on complexity, and algorithms for special computing devices such as networks or formulas. Prerequisite: CSE major and 521. Offered: alternate years.

CSE 523 Computational Geometry (3) Algorithms for discrete computational geometry. Geometric computation, range searching, convex hulls, proximity, Voronoi Diagrams, intersection. Application areas include VLSI design and computer graphics. Prerequisites: CSE major and 521. Recommended: 457 or equivalent. Offered: alternate years.

CSE 524 Parallel Algorithms (3) Design and analysis of parallel algorithms: fundamental parallel algorithms for sorting, arithmetic, matrix and graph problems and additional selected topics. Emphasis on general techniques and approaches used for develop-

ing fast and efficient parallel algorithms and on limitations to their efficacy. Prerequisite: CSE major and 521. Offered: alternate years.

CSE 531 Automata, Computability, and Complexity (3) Computational models including finite automata, regular expressions, context-free grammars, pushdown automata, Turing machines, and techniques for analyzing them. Basic computability theory and undecidability. Fundamentals of computational complexity theory and NP-completeness. Prerequisite: CSE majors only.

CSE 532 Complexity Theory (3) Deterministic, nondeterministic, alternating, and probabilistic Turing machines. Time and space complexity, complexity classes, complexity hierarchies, and provably intractable problems. Prerequisite: CSE major and 531.

CSE 533 Advanced Topics in Complexity Theory (3) Topics in computational complexity more sophisticated than those treated in 532. Topics are expected to vary from year to year, but might typically focus on such areas as parallel complexity, probabilistic complexity, circuit- or automaton-based complexity, or logic. Prerequisite: CSE major. Offered: alternate years.

CSE 536 Theory of Distributed Computing (3) Formal approaches to distributed computing problems. Topics vary, but typically include models of distributed computing, agreement problems, impossibility results, mutual exclusion protocols, concurrent reading while writing protocols, knowledge analysis of protocols, and distributed algorithms. Prerequisite: CSE major. Offered: alternate years.

CSE 540 Discrete System Simulation (3) Principles of simulation of discrete, event-oriented systems. Model construction, simulation and validation. Distributed and parallel simulation techniques. Basic statistical analysis of simulation inputs and outputs. Use of C, an object-oriented language, and S, a statistical analysis package. Prior familiarity with the concepts of probability and statistics desirable. Prerequisite: CSE major.

CSE 543 Computer System Performance (3) Emphasizes the use of analytic models as tools for evaluating the performance of centralized, distributed, and parallel computer systems. Prerequisite: CSE major and 451.

CSE 548 Computer Systems Architecture (3) Notations for computer systems. Processor design (single chip, look-ahead, pipelined, data flow). Memory hierarchy organization and management (virtual memory and caches). Microprogramming. I/O processing. Multiprocessors (SIMD and MIMD). Prerequisites: CSE major and 451.

CSE 549 High-Performance Computer Architectures (3) Algorithm design, software techniques, computer organizations for high-performance systems. Selected topics from: VLSI complexity for parallel algorithms, compiling techniques for parallel and vector machines, large MIMD machines, interconnection networks, reconfigurable systems, memory hierarchies in multiprocessors, algorithmically specialized processors, data flow architectures. Prerequisite: CSE major and 548 or permission of instructor. Offered: alternate years.

CSE 551 Operating Systems (3) Operating systems design and construction techniques. Concurrent programming, operating system kernels, correctness, deadlock, protection, transaction processing, design methodologies, comparative structure of different kinds of operating systems, and other topics. Prerequisite: 451; CSE major.

CSE 552 Distributed and Parallel Systems (3) Principles, techniques, and examples related to the design, implementation, and analysis of distributed and parallel computer systems. Prerequisite: CSE major and 551.

CSE 553 Real-Time Systems (3) Design and construction of software for real-time computer systems. Software architectures. Requirements and specification methods. Scheduling algorithms and timing analysis. Real-time operating systems. Real-time programming languages. Selected case studies. Prerequisites: 451; CSE major. Offered: alternate years.

CSE 557 Computer Graphics (3) Generation and interpretation of pictures by computer with or without human interaction. Graphics hardware. Display programming. Picture transformation. Representations of pictures and their attributes. Curve and surface design and generation. Input methods. Graphics programming languages and systems. Laboratory project required. Prerequisite: CSE major and knowledge of data structures and linear algebra.

CSE 558 Special Topics In Computer Graphics (3) Advanced topics in computer graphics not treated in CSE 557. Topics vary from year-to-year but typically include advance image synthesis and/or computer aided geometric design. Prerequisite: CSE major and 523 or 557 or permission of instructor. Offered: alternate years; Sp.

CSE 561 Computer Communication and Networks (3) Fundamentals of data transmission: coding, message formats, and protocols. Organization of computer networks. Examples of network implementations. Prerequisite: CSE or E E major and 451 or equivalent.

CSE 563 Fault Tolerant Computing (3) Faults and their manifestation, issues, theory, and techniques of reliable systems design, testing, design for testability, self-checking and fail-safe circuits, coding techniques, system-level fault diagnosis, fault-tolerant communication, reliable software design, and evaluation criteria. Prerequisite: basic knowledge of digital systems design or permission of instructor. Offered: jointly with E E 563.

CSE 567 Principles of Digital Systems Design (3) Principles of logic design, combinational and sequential circuits, minimization techniques, structured design, methods, CMOS technology, complementary and ratioed gates, delay estimation and performance analysis, arithmetic circuits, memories, clocking methodologies, synthesis and simulation tools, VLSI processor architecture. Prerequisite: CSE major and basic knowledge of logic design.

CSE 568 Advanced VLSI Laboratory (3) Advanced topics on MOS technology and CAD software; students design a large chip (more than 10K transistors) to be fabricated at end of term; laboratory activities include circuit and logic design, graphic layout of a chip, extraction, checking, and simulation. Prerequisite: CSE major and 567 or permission of instructor.

CSE 573 Artificial Intelligence I (3) Introduction to computational models of thought and construction of intelligent information systems. Topics include search algorithms, data dependencies and truth-maintenance systems, approaches to knowledge representation, automated deduction, reasoning under uncertainty, and machine learning. Prerequisites: 421 or equivalent; exposure to logic, LISP programming experience, CSE major.

CSE 574 Artificial Intelligence II (3) Advanced topics in artificial intelligence. Subjects include planning, natural language understanding, qualitative physics, machine learning, and formal models of time and action. Students are required to do projects. Prerequisite: 573. CSE major.

CSE 576 Image Understanding (3) Overview of computer vision, emphasizing the middle ground between image processing and artificial intelligence. Image formation, preattentive image processing, boundary and region representations, and case studies of vision architectures. Prerequisites: 573 or E E 562 or permission of instructor. Offered: jointly with E E 576.

CSE 577 Mathematical Morphology (3) Theory of mathematical morphology and its application in various commercial, industrial, medical, and research applications. Contents include binary and grayscale morphologic dilation, erosion, opening and closing, morphological sampling theorem, structuring element decomposition, thinning, skeletonizing, and relational shape description. Group project. Prerequisite: 576 or E E 568 or permission of instructor. Offered: jointly with E E 577; alternate years.

CSE 581 Parallel Computation In Image Processing (3) Parallel architectures, algorithms, and languages for image processing. Cellular array, pipelined and pyramid machines, instruction sets, and design issues. Parallel implementations of filtering, edge detection, segmentation, shape, stereo, motion, relaxation algorithms, multiresolution methods, and iconic-to-symbolic transforms. Students write and debug programs for parallel computers. Prerequisite: permission of instructor. Offered: alternate years.

CSE 590 Special Topics In Computer Science (*) Several offerings each quarter, on topics of current interest. Prerequisite: permission of instructor. Offered: AWSp.

CSE 600 Independent Study or Research (*) Credit/no credit only. Offered: AWSp.

CSE 700 Master's Thesis (*) Credit/no credit only. Offered: AWSp.

CSE 800 Doctoral Dissertation (*) Credit/no credit only. Offered: AWSp.

Electrical Engineering

253 Electrical Engineering

Electrical engineering is concerned with the understanding and utilization of electricity and providing society with useful, efficient, and economic products and services. The scope of activity is wide-ranging and diversified, covering such topics as planning, design, implementation, and maintenance of large-scale systems for worldwide communication; computer systems and their applications; information management; design and use of microelectronic and photonic devices; signal and image processing; instrumentation and control systems; and power generation and distribution. In electrical engineering, rapid technological innovation is the rule rather than the exception. Preparation for a professional career in the field builds on a solid foundation in mathematics and the physical sciences, plus practice in the application of these basic principles to practical problems. In addition to technical education, the practice of engineering in contemporary society requires significant emphasis in the humanities and social sciences.

The mission of the Department of Electrical Engineering (EE) is to be among the best in terms of quality of classroom and laboratory instruction, student and faculty research, and the preparation of our graduates for engineering careers. The objectives of the EE undergraduate program are: to provide students with a broad coverage of topics in electrical engineering with a solid foundation in mathematics, natural and physical sciences, and engineering fundamentals; to provide students with relevant laboratory experience throughout the program, culminating in a senior capstone design project required of all students; and to provide students with intellectual tools, analytical and design skills, communication techniques, ethical principles and values, humanistic and social studies experience, and a scholarly and professional attitude that will establish a foundation for a lifetime of learning, professional growth, and development as an engineering professional and a responsible citizen of society.

The core curriculum consists of required courses in the College and department that focus on mathematical and physical principles and on modern techniques that have applications to real-world problems. Technical electives offer the opportunity to obtain breadth and depth in such areas as electronic materials, devices and circuits, power systems and energy conversion, computers and information systems, communication systems, automatic controls, robotics, and signal processing.

The department's graduates are actively recruited by high-technology industries and those who pursue further graduate studies are quite successful in highly competitive programs nationally and internationally.

Undergraduate Program

Bachelor of Science in Electrical Engineering

Admission Requirements: Because resources are limited, students must apply for admission to the electrical engineering program. Application forms and a comprehensive booklet, *The Electrical Engineering Handbook for Undergraduates*, can be obtained from the undergraduate adviser for electrical engineering. The department classifies applicants by admission group; the specific requirements for each are described below.

(1) **Early Admissions Group (EAG):** Open to students enrolled at the UW. Applicants must have completed 15 credits of mathematics at the level of MATH 124, 125, 126 or equivalent; 10 credits of laboratory physical sciences at the level of PHYS 121/131, 122/132, 123/133 or CHEM 140, 141, 150, 151 or equivalent; and 5 credits of English composition. At least 15 of these 30 credits must be completed at the UW prior to application. The cumulative GPA in these courses must be 2.50 or higher. In addition to the College of Engineering requirements above, the department requires the completion of CSE/ENGR 142. Admission is for autumn quarter only; the application deadline is given in the departmental handbook.

(2) **Upper-Division Admissions Group (UAG):** Students must have completed 64 credits applicable to the degree, including MATH 124, 125, 126, 307; PHYS 121/131, 122/132, 123/133; CHEM 140, 141; CSE/ENGR 142; and at least 5 credits of English composition. Admission is for autumn or spring quarter; application deadlines are given in the departmental handbook.

Graduation Requirements: In addition to the College of Engineering requirements in General Education and Engineering Fundamentals listed above, the following courses are required for the B.S.E.E. degree: a core of 35 credits of specified electrical engineering courses normally taken in the junior year and 25 credits of electrical engineering electives. To graduate, a student must earn a total of 180 credits with a minimum cumulative GPA of 2.00 in all electrical engineering courses, with no grade below 1.0 in any of these courses. In addition, it is required that each student's program of study conform with the Accreditation Board for Engineering and Technology (ABET) requirement of at least 48 credits in engineering science and 24 credits in engineering design. Additional graduation requirements include:

Natural World: 25 credits to include CHEM 140 (4), 141 (1); PHYS 121/131 (5), 122/132 (5), and 123/133 (5).

Mathematics: 24 credits to include MATH 124 (5), 125 (5), 126 (5), 307 (3), 308 (3), and 324 (3).

Written and Oral Communication: 12 credits to include one 5-credit English composition course from the approved University list. ENGR 231 (3), and ENGR 333 (4).

Engineering Fundamentals: 17 credits to include CSE/ENGR 142 (4), CSE 143 (5), ENGR 215 (4), and E E 235 (4).

Approved Non-Electrical Engineering Electives: 10 credits selected from the departmental handbook.

Statistics: 4 credits: STAT/MATH 390.

Areas of Knowledge (Visual, Literary, & Performing Arts and Individuals & Societies): 25 credits to include a minimum of 10 credits in each area. Courses that count toward these requirements are identified as VLPA or I&S in the *General Catalog* and in the *Quarterly Time Schedule*. Also required is one in-depth sequence (minimum 8 credits) consisting of two or more related courses.

Free Electives: 8 credits.

The departmental policy on continuation is consistent with the continuation policy of the College but also includes supplementary requirements specific to the department. Details may be obtained from the department advising office.

Many scholarships specifically for electrical engineering majors, based on merit and financial need, are awarded each year. Students interested in applying for these and other College of Engineering scholarships may obtain information from the Department of Electrical Engineering Scholarship Award Committee Chair.

Graduate Program

The Department of Electrical Engineering offers graduate programs leading to the degrees of Master of Science in Electrical Engineering (M.S.E.E.) and Doctor of Philosophy (Ph.D.). Graduate courses and research programs are offered in electromagnetics, radio science, electronic materials and devices, microelectronics, VLSI design, computer engineering, digital systems, computer architecture, computer networks and distributed systems, software engineering, operating systems, microprocessors, energy systems, power electronics and electric drives, control systems, circuits and network theory, computational intelligence, telecommunications, signal processing, optics, acoustics, and biosystems. Opportunities also exist for participation in research on medical instrumentation in the bioengineering program and in marine acoustics and instrumentation systems at the Applied Physics Laboratory.

For the M.S.E.E. degree, a minimum of 45 credits is required. Students writing a thesis must register for 9-12 credits. Students selecting the nonthesis option can either complete their degree by total course work or by a one-term project of 4-8 credits. Course work for any of the above-mentioned options must be selected with each student's supervisory committee approval to prepare the student in an area of specialization. If more flexibility is desired than the M.S.E.E. requirements allow, the interdisciplinary degree of Master of Science in Engineering is available.

The M.S.E.E. degree is also offered to part-time students employed in local industries through the Televised Instruction in Engineering (TIE) program. Regular graduate courses are offered over cable television or by videotape to enable working engineers to participate in the program without traveling to campus.

For the Ph.D. degree, students must pass the departmental qualifying examination, pass an advanced General Examination, pursue an original research problem, and report the results of that research in a dissertation that must be a contribution to knowledge. At least one year of course work beyond the M.S.E.E. degree is usually desirable. Exceptionally qualified students are encouraged to pursue the Ph.D. degree directly without first earning a master's degree.

Research Facilities

Facilities in the Electrical Engineering Department include laboratories for solid-state materials, microtechnology, microwaves and millimeter waves, computer technology, computer systems, machine vision, analog and digital electronics, energy systems, power electronics and electric drives, bioelectronics, control systems, statistical data analysis, computational intelligence, and signal processing and classification. Extensive computer facilities are available, and there is an integrated circuit and semiconductor sensor fabrication facility as well as an interactive facility for speech and sonar analysis.

Admissions Qualifications

In addition to meeting Graduate School admission requirements, the Graduate Record Examination (GRE) general test is required of all students. Official test scores must be submitted, along with a formal application and a minimum of two reference letters. Although most applicants have baccalaureate degrees in electrical engineering, applicants with degrees in other branches of engineering, the physical sciences, computer science, or mathematics often are able to pursue graduate study in electrical engineering following some additional preparation.

Financial Aid

Research assistantships, teaching assistantships, scholarships, and graduate fellowships are available to qualified graduate students in all areas of electrical engineering. Most awards include a monthly stipend plus payment of tuition and fees.

Correspondence and Information

Graduate Program Coordinator
Department of Electrical Engineering, Box 352500

Faculty

Chair

Gregory L. Zick

Professors

Afromowitz, Martin * 1975; PhD, 1969, Columbia University; microtechnology, solid-state and fiber-optics sensors, biomedical instrumentation.

Albrecht, Robert W. * 1961; MS, 1958, PhD, 1961, University of Michigan; robotics, stochastic analysis, nuclear reactor theory.

Alexandro, Frank J. * 1964; MSEE, 1959, DSc, 1964, New York University; control systems, stochastic estimation methods.

Andersen, Jonny * 1967; MS, 1962, PhD, 1965, Massachusetts Institute of Technology; analog circuit design, modelling and CAD.

Atlas, Les Eugene * 1983; MS, 1978, University of Wisconsin; PhD, 1983, Stanford University; time-frequency representations, digital signal processing applied to speech, audio, manufacturing.

Baer, Jean-Loup * 1969, (Adjunct); MS, 1963, Grenoble; PhD, 1968, University of California (Los Angeles); parallel processing, computer architecture.

Bergseth, F. Robert 1947, (Emeritus); MSEE, 1938, Massachusetts Institute of Technology; electric power systems.

Bernard, Gary D. * 1989, (Affiliate); PhD, 1964, University of Washington; advanced sensors for manufacturing, time-frequency classification, visual information processing.

Clark, Robert N. * 1957, (Emeritus); PhD, 1969, Stanford University; automatic control systems, fault detection in dynamic systems.

Crum, Lawrence A. * 1992, (Research); PhD, 1967, Ohio University.

Damborg, Mark J. * 1969; MSEE, 1963, PhD, 1969, University of Michigan; control systems theory, power system dynamics, expert systems and database applications.

Dow, Daniel G. * 1968, (Emeritus); PhD, 1958, Stanford University; microwaves, physical electronics, semiconductor devices, sensors.

Ehrenberg, John E. * 1970, (Affiliate); PhD, 1973, University of Washington; communications, signal processing, underwater acoustics.

El-Sharkawi, Mohamed A. * 1980; PhD, 1980, University of British Columbia (Canada); analysis and control of power electronics, systems, and electric drives; artificial neural networks.

Ewart, Terry E. * 1956, (Adjunct); PhD, 1965, University of Washington; physics, ocean microstructure, diffusion, acoustic transmission.

Furness, Thomas A. * 1989, (Adjunct); PhD, 1981, University of Southampton (UK); display systems engineering, human factors, computer graphics.

Guilford, Edward C. * 1959, (Emeritus); PhD, 1959, University of California (Berkeley); electronics, computers.

Haralick, Robert M. * 1986; PhD, 1969, University of Kansas; computer vision, artificial intelligence, pattern recognition, image processing.

Holden, Alistair D. * 1958; PhD, 1964, University of Washington; artificial intelligence and applications, speech understanding, neural networks.

Hsu, Chih-Chi * 1958, (Emeritus); PhD, 1951, Ohio State University; control systems and cybernetics.

Ishimaru, Akira * 1953; PhD, 1958, University of Washington; electromagnetics, optics, acoustics, applied mathematics, scattering theory.

Jackson, Darrell R. * 1976, (Research); PhD, 1966, University of Washington; PhD, 1977, California Institute of Technology; signal processing, underwater acoustics, wave scattering.

Johnson, David L. 1955, (Emeritus); PhD, 1955, Purdue University; digital design, artificial intelligence, models of learning systems.

Kim, Yongmin * 1982; PhD, 1982, University of Wisconsin; computer architecture, imaging systems, computer graphics, multimedia, modeling and instrumentation.

Lauritzen, Peter O. * 1968; PhD, 1961, Stanford University; power electronics, device modeling for circuit simulation, electronic devices.

Lewellen, Thomas * 1975, (Adjunct); PhD, 1972, University of Washington; bioengineering, electrical engineering.

Lewis, Laurel J. 1946, (Emeritus); PhD, 1947, Stanford University; circuits and systems.

Liu, Chen-Ching * 1983; PhD, 1983, University of California (Berkeley); power system analysis/computing, intelligent system methodologies/applications, power electronics.

Lytle, Dean W. * 1958, (Emeritus); PhD, 1957, Stanford University; communication and stochastic systems analysis, marine acoustics.

Marks, Robert * 1977; PhD, 1977, Texas Technological University; neural networks, computational intelligence, fuzzy systems, statistical communication theory.

Meditch, James S. * 1977; PhD, 1961, Purdue University; broadband communication networks, video and multimedia systems.

Moritz, William E. * 1973; PhD, 1969, Stanford University; human-powered transportation.

Pearsall, Thomas P. * 1989; PhD, 1973, Cornell University; physics of semiconductors and the technology of semiconductor devices.

Peden, Irene Carswell * 1961, (Emeritus); PhD, 1962, Stanford University; subsurface remote sensing and applied electromagnetics.

Pinter, Robert B. * 1967; PhD, 1964, Northwestern University; cybernetics, robotics, biophysics.

Porter, Robert P. * 1985; PhD, 1970, Northeastern University; acoustics, electromagnetics, signal processing.

Ritcey, James A. * 1985; PhD, 1985, University of California (San Diego); communications, signal processing, radar/sonar.

Seilga, Thomas A. * 1990; PhD, 1965, Pennsylvania State University; electromagnetics, wave propagation, remote sensing applied to atmosphere, geoscience, transportation.

Shapiro, Linda G. * 1986; PhD, 1974, University of Iowa; computer vision, artificial intelligence, pattern recognition, robotics.

Sigelmann, Rubens A. * 1959, (Emeritus); PhD, 1963, University of Washington; bioengineering, ultrasonics, propagation, acoustics.

Soma, Mani * 1982; PhD, 1980, Stanford University; IC design and testing, mixed signal testing, bioengineering.

Somani, Arun Kumar * 1985; PhD, 1985, McGill University (Canada); parallel computer systems architectures, fault-tolerant computing, interconnection networks.

Spelman, Francis A. * 1961, (Adjunct); PhD, 1975, University of Washington; biophysics of implanted cochlea, bioinstrumentation for primate research.

Spindel, Robert C. 1987; MS, 1966, PhD, 1971, Yale University; ocean acoustics, signal processing, acoustic navigation systems, acoustic tomography.

Szabalya, John F. * 1984, (Affiliate); PhD, 1948, Josef Nador University (Hungary).

Tanimoto, Steven L. * 1977, (Adjunct); PhD, 1975, Princeton University; image analysis, artificial intelligence, computer graphics, educational technology.

Tsang, Leung * 1983; PhD, 1976, Massachusetts Institute of Technology; wave propagation and scattering, remote sensing and optics.

Vagners, Juris * 1967, (Adjunct); PhD, 1967, Stanford University; dynamics, controls and optimization.

Venkata, Subrahmanyam S. * 1979; PhD, 1971, University of South Carolina; computer applications to power systems, AI applications, transmission and distribution.

Yee, Sinclair S. * 1966; PhD, 1965, University of California (Berkeley); physical electronics, semiconductor devices, microsensors.

Zick, Gregory L. * 1974; PhD, 1974, University of Michigan; image and multimedia databases, medical imaging.

Associate Professors

Chan, Chi H. * 1989; PhD, 1987, University of Illinois; computational electromagnetics, microwave ICs, scattering and antennas, bioengineering.

Darling, Robert B. * 1985; PhD, 1985, Georgia Institute of Technology; semiconductor devices, solid state, optoelectronics, microelectronics.

Giri, Jay * 1990, (Affiliate); PhD, 1977, Clarkson University; power system analysis, software development and user interfaces for real-time power system control.

Hannaford, Blake * 1989; PhD, 1985, University of California (Berkeley); human and robotic movement control, bioengineering, controls, human-machine interaction.

Helms, Ward J. * 1964; PhD, 1968, University of Washington; VLSI analog and digital circuit design, integrated circuits, acoustics and audio.

Hwang, Jenq-Neng * 1989; PhD, 1988, University of Southern California; parallel architectures, signal and image processing, neural networks.

Katz, Philip L. * 1980, (Research); PhD, 1970, University of Michigan.

Kuga, Yasuo * 1991; PhD, 1983, University of Washington; microwave and millimeter-wave remote sensing, optics, and electromagnetics.

Kuhn, Kellin J. * 1987; PhD, 1985, Stanford University; optics and photonics, environmental sensing, laser development.

Nelson, Brian A. * 1987, (Research); PhD, 1987, University of Wisconsin; fusion plasma physics, plasma processing of materials, data acquisition software.

Redeker, Charles C. 1963, (Emeritus); MS, 1964, University of Washington.

Riskin, Eve A. * 1990; PhD, 1990, Stanford University; image compression and processing, and signal processing.

Sechen, Carl M. * 1992; PhD, 1987, University of California (Berkeley); design and computer-aided design of digital integrated circuits and systems.

Sharma, Tilak Chand * 1990, (Affiliate); PhD, 1972, University of Alberta (Canada); reliability methodology for very highly reliable fault-tolerant systems.

Thorsos, Eric I. * 1980, (Research); PhD, 1972, Massachusetts Institute of Technology; rough surface scattering, numerical simulation and theory, underwater acoustics.

Winebrenner, Dale P. * 1986, (Research); PhD, 1985, University of Washington; wave propagation and scattering and remote sensing of planetary surfaces.

Yang, Andrew T. * 1989; PhD, 1989, University of Illinois; VLSI CAD, modeling and simulation of GaAs/Si Devices.

Assistant Professors

Azizoglu, Murat 1994; MS, 1987, Ohio State University; PhD, 1991, Massachusetts Institute of Technology; communications, optical networks, information theory.

Beausoleil, Raymond G. * 1987, (Affiliate); PhD, 1987, Stanford University; laser physics, nonlinear optics, quantum optics, and computational physics.

Belcher, Edward O. * 1982, (Affiliate); MA, 1970, Stanford University; MSEE, 1973, Purdue University; signal processing, artificial intelligence, underwater acoustics.

Choi, Jai Joon * 1988, (Affiliate); PhD, 1990, University of Washington; adaptive signal processing, neural networks, and fuzzy logic.

Christie, Richard Dunstan Jr. * 1989; PhD, 1989, Carnegie-Mellon University; power systems analysis, expert systems applications, user interfaces.

Dailey, Daniel J. * 1982, (Research); PhD, 1988, University of Washington; time series modeling of physical phenomena, optimization, distributed computing, networking.

Luby, James C. * 1979, (Affiliate); PhD, 1984, University of Washington; signal processing, underwater acoustics, computer simulation, adaptive array processing, tracking.

Meldrum, Deirdre R. * 1992; PhD, 1992, Stanford University; laboratory automation systems, genome analysis, modeling and control of dynamic systems, robots.

Oh, Seho * 1987, (Affiliate); PhD, 1989, University of Washington; neural networks and fuzzy systems.

Phillips, Hsin Tsai-Yun * 1988, (Affiliate); PhD, 1984, University of Maryland; computer vision, document image understanding, image database, software engineering.

Ramon, Ceon * 1989, (Adjunct Research); PhD, 1973, University of Utah; biomagnetic imaging and its application to detect cardiac dysrhythmia problems.

Sahr, John D. * 1991; PhD, 1990, Cornell University; radar remote sensing, ionospheric physics; signal processing; wireless communications.

Yuan, Chun 1991, (Adjunct); PhD, 1988, University of Utah; medical biophysics, MRI.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

E E 233 Circuit Theory (5) Electric circuit theory. Analysis of circuits with sinusoidal signals. Phasors, system functions, and complex frequency. Frequency response. Computer analysis of electrical circuits. Power and energy. Two port network theory. Laboratory in basic electrical engineering topics. Prerequisite: ENGR 215. Offered: AWSp.

E E 235 Continuous Time Linear Systems (4) Introduction to continuous time signal analysis. Basic signals including impulses, pulses, and unit steps. Periodic signals. Convolution of signals. Fourier series and transforms in discrete and continuous time. Computer laboratory. Prerequisites: PHYS 122 and 132 and concurrent registration in MATH 307. Offered: AWSp.

E E 298 Special Topics in Electrical Engineering (1-5) New and experimental approaches to basic electrical engineering. May include design and construction projects. Prerequisite: permission of department Chairperson. Offered: AWSp.

E E 331 Devices and Circuits I (5) Physics, characteristics, applications, analysis, and design of circuits using semiconductor diodes and field-effect transistors with an emphasis on large-signal behavior and digital logic circuits. Classroom concepts are reinforced through laboratory experiments and design exercises. Prerequisite: 233. Offered: AWSp.

E E 332 Devices and Circuits II (5) Characteristics of bipolar transistors, large- and small-signal models for bipolar and field effect transistors, linear circuit applications, including low and high frequency analysis of differential amplifiers, current sources, gain stages and output stages, internal circuitry of op-amps, op-amp configurations, op-amp stability and compensation. Weekly laboratory. Prerequisite: 331. Offered: AWSp.

E E 341 Discrete Time Linear Systems (5) Discrete time signals and systems, impulse response, convolution, Z-transforms, discrete time Fourier analysis. Computer laboratory. Prerequisites: 235, MATH 307. Offered: AWSp.

E E 351 Energy Systems (5) Introduction to theory and methods of analysis in the use of typical apparatus to generate, transmit, utilize energy in electrical form. Includes conventions of circuit description, balanced polyphase circuits, complex power concept, transformer, fundamentals of electromechanical energy conversion, practical synchronous induction and commutator machines, an introduction to power electronics circuits. Prerequisite: 233. Offered: AWSp.

E E 361 Applied Electromagnetics (5) Introductory electromagnetic field theory and Maxwell's equation in integral and differential forms; uniform plane waves in linear medium; boundary conditions and reflection and transmission of waves; guided waves; transmission lines and Smith chart; electrostatics. Prerequisites: 233, MATH 324. Offered: AWSp.

E E 371 Digital Circuits and Systems (5) Overview of digital computer systems. Digital logic, Boolean algebra, combinational and sequential circuits and logic design, programmable logic devices, and the

design and operation of digital computers, including ALU, memory, and I/O. Four-hour laboratories every other week. Prerequisites: CSE 143. Offered: AWSp.

E E 399 Special Topics In Electrical Engineering (1-5) New and experimental approaches to current electrical engineering problems. May include design and construction projects. Prerequisite: permission of department. Offered: AWSps.

E E 400 Advanced Topics In Electrical Engineering (1-4, max. 8) Contemporary topics at the advanced undergraduate elective level. Faculty presents advanced elective topics not included in the established curriculum. Prerequisite: permission of instructor. Offered: AWSp.

E E 411 Introductory Network Synthesis (3) Network representation in the complex frequency domain, realizability criteria for driving-point and transfer functions, canonical forms, and application of the digital computer in synthesis procedures. Prerequisites: 233 and senior standing. Offered: A.

E E 415 Computer-Aided System Analysis and Design (3) Concepts, principles, and techniques concerned with the design, testing, and application of general-purpose problem-oriented computer programs for analyzing large-scale systems. Prerequisites: ENGR 142 and senior standing. Offered: Sp.

E E 417, 418 Introductory Communication Theory I, II (4,3) Techniques of analog and digital communications. Elementary concepts of probability, random variables, and processes. Signals, spectra, random signals, and noise. Base-band communication by digital and analog methods. Modulation techniques including AM, FM, PM, PAM, PCM. Information theory, channel capacity, and error-control coding. Prerequisites: 341 for 417; 417 for 418. Offered: W, Sp.

E E 421 Electroacoustics (4) Fundamental principles of acoustics, electroacoustical devices, and systems. Generation, transmission, reflection, and reception of acoustic waves. Transduction devices and their characteristics. Select topics in applied acoustics, including the application of design principles via group or individual projects. Prerequisite: 361 or permission of department. Offered: A.

E E 433 Analog Circuit Design (5) Design of analog circuits and systems applying modern integrated circuit technology: operational amplifiers, differential amplifiers, active filters, voltage references and regulators. Prerequisite: 332. Offered: AW.

E E 436 Medical Instrumentation (4) *Spelman* Introductory course in the application of instrumentation to medicine. Topics include transducers, signal-conditioning amplifiers, electrodes and electrochemistry, ultrasound systems, electrical safety, and the design of clinical electronics. Laboratory included. For upper-division and first-year graduate students who are preparing for careers in bioengineering-both research and industrial. Prerequisite: 433 or permission of department. Offered: jointly with BIOEN 436; Sp.

E E 440 Introduction to Statistical Signal Processing (4) Introduction to probability and random signals with applications in signal processing. Probability distributions, expectation, and correlation. Random signals. Statistical signal processing using minimum mean-square error filtering and matched filters. Offered: A.

E E 442 Digital Signals and Filtering (3) Methods and techniques for digital signal processing. Review of sampling theorems, A/D and D/A converters. Demodulation by quadrature sampling. Z-transform methods, system functions, linear shift-invariant systems, difference equations. Signal flow graphs for digital networks, canonical forms. Design of digital filters, practical considerations, IIR and FIR filters. Digital Fourier transforms and FFT techniques. Prerequisite: 341 or permission of department. Offered: W.

E E 443 Design and Application of Digital Signal Processing (5) Application of learned theories/algorithms and available computer technologies to modern image and speech processing problems. Two-dimensional signals and systems. Image transform, enhancement, restoration, coding. Characteristics of speech signals, linear predictive coding (LPC) of speech, pitch detection, and LPC speech synthesis, speech recognition, hardware designs for signal processing. Prerequisites: 442. Offered: Sp.

E E 445 Nonlinear Systems Analysis (4) Dynamic analysis of nonlinear circuits, neural networks and of other simple systems. Exact methods, graphical methods, approximate methods, including linearization and numerical and analog computer solutions. Stability. Forced oscillations. Prerequisite: 235 or permission of department. Offered: A.

E E 448 Control System Analysis I (4) Linear Servomechanism theory and design principles. Pole-zero analysis, stability of feedback systems by root locus and real-frequency response methods. Design methods of Bode and Nichols. Introduction to advanced topics in automatic control theory, state variable methods. Prerequisite: 233 or permission of instructor. Offered: AWSp.

E E 448 Control Systems Sensors and Actuators (3) Study of components and formulation of their mathematical models. Amplifiers, servomotors, synchros, gyroscopes. Accelerometers, reaction mass actuators, potentiometers, shaft encoders and resolvers, proximity sensors, force and torque transducers. Experimental determination of component models and model parameters. Two 3-hour laboratories per week. Prerequisite: senior standing. Offered: jointly with A A 448; W.

E E 449 Design of Automatic Control Systems (4) Design problems in electromechanical feedback systems, aerospace and hydrospace vehicles, systems with unstable plants, lightly damped modes, nonminimum phase plants, nonlinear plants. Computer-aided simulation and design emphasized. Team effort encouraged. Design reviews, oral presentations required. Prerequisite: 446 or A A 450 or M E 471 or equivalent. Offered: jointly with A A 449; Sp.

E E 452 Power Electronics Design (5) Electronic conversion and control of electrical power. Includes semiconductor switching devices, power converter circuits, design of magnetics, and control of power converters. Also ac/ac, ac/dc, and dc/dc power converters; circuit simulation; extensive laboratory work a four-week power converter design project. Prerequisites: 332, 351. Offered: A.

E E 453 Electric Drives (5) Elements of drive systems, speed-torque characteristics of electric motors and industrial loads, solid-state converter. Starting and braking methods of loaded motors. Speed control of electric motors. Solid-state drives. Transient analysis of loaded motors. Special forms of individual- and multimotor drives. Prerequisite: 351 and permission of instructor. Offered: W.

E E 454 Power System Analysis I (4) Introduction to methods of analyzing power systems. Includes symmetrical components, calculation of line parameters, representation of transmission lines and power components, and power flow control. Prerequisite: 351 or permission of instructor. Offered: A.

E E 455 Power System Analysis II (4) Analysis of symmetrical and unsymmetrical power systems' networks, fault analysis, and stability studies. Prerequisites: 351 or permission of department. Offered: W.

E E 456 Computer-Aided Design in Power Systems (4) Design-oriented course in power system engineering. Students are assigned a project concerning system operation and planning, steady-state and dynamic behaviors of power systems, or distribution systems. Each involves formulation of design criteria, development of approach, application of existing soft-

ware. Prerequisite: 454 or 455 or 457, or permission of instructor. Offered: Sp.

E E 457 Electric Energy Distribution Systems (4) Introduction to electric utility distribution systems. Primary and secondary network analysis and design, distribution substation problems, distribution transformers, capacitor application, overcurrent and over-voltage protection. System planning and reliability. Prerequisite: 351 or permission. Offered: Sp.

E E 461 Introduction to Computer-Communication Networks (3) Computer network architectures, protocol layers. Transmission media, encoding systems, error detection, multiplexing, switching. Data link, multiple access channel protocols. Methods for network routing, congestion control, flow control. End-to-end transport services, protocols. Network security, privacy. Applications including electronic mail, virtual terminals, distributed operating systems. Prerequisite: senior standing. Offered: jointly with CSE 461; A.

E E 462 Mobile Robots I: Vehicles (4) Principles of autonomous vehicles and environments in which they operate. CAD modeling of environments, knowledge base development of environments, vehicle performance by teleoperation, coordinate transformations, and generation of trajectories for vehicle drive and steering. Characteristics of sensors including sonar, laser range, infra-red, tactile, and video. Prerequisites: senior standing. Offered: A.

E E 463 Mobile Robots II: Intelligent Control (4) Autonomous vehicles operating in semi-structured environments. Expert system modeling of the interaction of vehicles and environments through sensors to perform tasks autonomously. Knowledge base development of robotic behaviors and environments. The principles of computer vision as applied to mobile robots. Prerequisites: 462. Offered: W.

E E 464 Mobile Robots III: Integration and Projects (4) Application of principles of autonomous navigation and control to actual vehicles in semi-structured laboratory environments. Projects to demonstrate autonomous behavior. Prerequisites: 463. Offered: Sp.

E E 465 Fiber Optics, Devices, and Applications (4) Wave propagation in optical waveguiding structures, signal distortion, coupling of modes, modulation, sources and detectors, fabrication and measurement methods, communication and sensor systems. Prerequisite: 332; recommended: 361. Offered: W.

E E 466 Design in Electromagnetics, Optics, and Acoustics (4) Design of electromagnetic, optical, and acoustic (EOA) devices and systems. Measurements of material properties and system characteristics. Utilization of software for simulation of propagation, interaction and devices in optics, microwave, millimeter wave, acoustic, and ultrasound. A list of projects available prior to registration. Prerequisites: 361 and senior standing. Offered: Sp.

E E 467 Antennas and Remote Sensing (3) *Sahr, Tsang* Radiation and radio science; antenna fundamentals and applications; wave propagation and earth's environments; remote sensing. Prerequisites: 235 and 361 or permission of instructor. Offered: Sp.

E E 468 Wave Propagation in Optoelectronics (4) *Kuhn, Tsang* Electromagnetic wave propagation and diffraction and its applications to optoelectronics, imaging, and holography. Fraunhofer and Fresnel diffraction, lenses, Fourier optics, coupling of modes, distributed feedback structures, anisotropic media, optical modulators. Prerequisites: 235 and 361. Offered: W.

E E 471 Computer Design and Organization (5) Introduction to computer architecture, algorithms, hardware design for various computer subsystems, CPU control unit design, hardwired and micro-programmed control, memory organization, cache design, virtual memory, I/O organization, and I/O hardware design. Prerequisites: 371. Offered: ASP.

E E 472 Microcomputer Systems (5) Concepts of multi-level machines and computer systems organization. Utilizing microprocessors, digital computer studied at assembly- and high-language levels with emphasis on concepts of central processor architecture, memory organization, input/output and interrupts. Assembly language programming concepts applied to solution of various laboratory problems including I/O programming. Prerequisite: 471. Offered: AW.

E E 476 Digital Integrated Circuit Design (5) *Sechen* Comprehensive view of digital integrated circuit design. Topics to be covered include the design of inverters, static logic circuits, switch logic, and synchronous logic. Students design, simulate, and layout a complete digital IC using modern computer-aided design tools. Prerequisites 331 and 371. Offered: A.

E E 477 Custom Digital CMOS Circuit Design (4) *Sechen, Yang* Design and analysis of custom CMOS digital integrated circuits. Interface circuit design, memory design, datapath design. VLSI design methodologies, scaling properties and design tradeoffs. Prerequisite: 331.

E E 478 Design of Computer Subsystems (5) Design of digital computer subsystems and systems, using SSI, MSI, and LSI digital components. Combinational logic, sequential logic, memory hardware designs, I/O hardware and interface design, system design steps, high-speed digital circuit design, noise reduction techniques, and hardware description language. One four-hour laboratory each week. Prerequisites: 331 and 472. Offered: WSp.

E E 480 Microwave Engineering I (4) Analysis and design of transmission lines and matching circuits. Lossy transmission lines. Mode structures in metallic and dielectric waveguides. Microwave resonators and magnetic devices. Smith chart and matching techniques. Prerequisite: 361. Offered: A.

E E 481 Microwave Electronic Design (4) Design of microwave circuits using S-parameter techniques. Measurement techniques. CAD of microwave systems. Includes design, fabrication, and evaluation of a microwave amplifier. Prerequisite: 361. Offered: W.

E E 482 Semiconductor Devices (4) Fundamentals of semiconductor theory: carrier diffusion and drift; concept of direct and indirect energy materials; effective mass of mobile carriers; device physics: homo- and heterojunctions, operating principles of bipolar, junction, and MOS field-effect transistors. Prerequisite: 332. Offered: A.

E E 483 Semiconductor Device Design and Modeling (4) Design and characteristics of semiconductor devices using a PISCES-based commercial CAD tool; SPICE-type device models; device parameter extraction and optimization; completion of a device design and characterization project using these computer tools. Prerequisite: 482. Offered: W.

E E 484 Sensors and Sensor Systems (3) Theory, design, and fabrication of thermal, mass, electrochemical, and optical sensors; for measurements of physical, chemical, and biomedical parameters. Includes a course design project of students choice. Prerequisite: junior or senior standing in Electrical Engineering, Chemistry, or Bioengineering or permission of instructor. Offered: Sp.

E E 486 Fundamentals of Integrated Circuit Technology (3) *Aframowitz* Processing physics, chemistry, and technology, including evaporation, sputtering, epitaxial growth, diffusion, ion implantation, laser annealing, oxidation, chemical vapor deposition, photoresists. Design considerations for bipolar and MOS devices, material and process characterization. Future trends. Prerequisite: 482. Offered: Sp.

E E 488 Laser Electronics (4) Analysis and design of laser systems. Basic resonator design, Gaussian beams, longitudinal and transverse modes, rate equations, oscillation, gain, Q-switching, mode-

locking, and important non-linear processes. Design concepts underlying various laser systems discussed. Prerequisites: 361. Offered: A.

E E 498 Design of Consumer Electronics (4) Design of consumer electronics products. Typical products include conventional audio systems, CD players, VCRs, camcorders, and FAX systems. Choice of products varies from quarter to quarter. Course includes an integrated laboratory and design project. Prerequisites 233. Recommended: 331 and 332. Offered: ASp.

E E 499 Special Projects (2-5, max. 10) Assigned construction or design projects carried out under the supervision of the instructor. Prerequisite: permission of department. Offered: AWSpS.

Courses for Graduates Only

E E 500 Graduate Seminar (1, max. 3) Weekly seminars on current topics in electrical engineering. More than one section may be offered in a given quarter. Credit/no credit only. Offered: AWSp.

E E 501 Radar Remote Sensing (3) General introduction to radar remote sensing of geophysical targets. Fundamentals of radar systems, range-time diagram, ambiguity function, pulse compression, spectrum estimation for underspread and overspread targets; multi-antenna correlations, interferometry, closure phases; maximum entropy source imaging; Aperture Synthesis (SAR and ISAR). Offered: odd years; W.

E E 505 Introduction to Probability and Random Processes (4) *Lytle, Ritcey* Foundations for the engineering analysis of random processes: set theoretic fundamentals, basic axioms of probability models, conditional probabilities and independence, discrete and continuous random variables, multiple random variables, sequences of random variables, limit theorems, models of stochastic processes, noise, stationarity and ergodicity, Gaussian processes, power spectral densities. Prerequisite: graduate standing. Offered: AS.

E E 506, 507 Communication Theory I, II (3,3) *Lytle, Ritcey* Review of stochastic processes. Communication system models. Channel noise and capacity. Optimum detection, modulation and coding, convolutional coders and decoders. Typical channels, random and fading channels. Waveform communication, optimum filters. Prerequisite: 505 or equivalent. Offered: W, Sp.

E E 508 Stochastic Processes (3) *Lytle, Ritcey* Modeling and analysis of random processes encountered in engineering applications. Stationarity and ergodicity. Harmonic analysis, power spectral densities. Karhunen-Loeve expansions. Poisson, Gaussian, and Markov processes. Stochastic integrals and differential equations. Prerequisite: 505 or permission of instructor. Offered: W.

E E 509 Engineering Applications of Linear Graphs (3) *Andersen* Elementary theory of linear graphs, incidence, cut-set and circuit matrices, matrix formulation of loop, node, and state equations, topological analysis and synthesis of networks, signal flow graphs, applications to switching circuits, automata and communication nets. Prerequisite: graduate standing or permission of instructor. Offered: odd years; W.

E E 510 Mathematical Foundations of Systems Theory (4) *Damborg* Mathematical foundations for system theory presented from an engineering viewpoint. Includes set theory; functions, inverse functions; metric spaces; finite dimensional linear spaces; linear operators on finite dimensional spaces; projections on Hilbert spaces. Applications to engineering systems stressed. Prerequisite: graduate standing or permission of instructor. Offered: jointly with A A 546/CHEM E/ M E 510; odd years; A.

E E 511 Principles of Network Synthesis (3) *Andersen* Network representation in the complex fre-

quency domain, realizability criteria, synthesis of driving point and transfer impedance and coupling networks for prescribed transfer characteristics, canonical forms, and network equivalents, frequency and time domain aspects of approximating response functions. Prerequisite: graduate standing or permission of instructor. Offered: W.

E E 513 Active Circuit Theory (3) *Andersen* Principles of analysis and synthesis of linear active circuits. Emphasis on general principles, including conservation theorems, invariants, performance limitations in the presence of parasitic elements and realizability conditions. Illustrative applications related to negative resistance amplifiers, feedback amplifiers, and active filters. Prerequisite: 341 or permission of instructor. Offered: Sp.

E E 518 Digital Signal Processing (4) *Atlas* Digital representation of analog signals. Frequency domain and Z-transforms of digital signals and systems design of digital systems; IIR and FIR filter design techniques, fast Fourier transform algorithms. Sources of error in digital systems. Analysis of noise in digital systems. Prerequisites: knowledge of Fourier analysis techniques and graduate standing, or permission of instructor. Offered: A.

E E 519 Stochastic Analysis of Data From Physical Systems (4) *Atlas* Computer systems for acquisition and processing of stochastic signals. Calculation of typical descriptors of such random processes as correlation functions, spectral densities, probability densities. Interpretation of statistical measurements made on a variety of physical systems (e.g., electrical, mechanical, acoustic, nuclear). Lecture plus laboratory. Prerequisite: 505 or equivalent. Offered: W.

E E 520 Spectral Analysis of Time Series (4) Estimation of spectral densities for single and multiple time series. Basic theory for nonparametric estimation of spectral density, cross-spectral density and coherence for stationary time series, real and complex spectrum techniques. Bispectrum. Digital filtering techniques. Aliasing, prewhitening. Choice of lag windows and data windows. Use of the fast Fourier transform in spectral estimation and computation of correlation functions. The parametric autoregressive spectral density estimate for single and multiple stationary time series. Spectral analysis of nonstationary random processes, and for randomly sampled processes. Techniques of robust spectral analysis. Prerequisite: one of STAT 342, 390, 481, E E 505, or permission of instructor. Offered: jointly with STAT 520; W.

E E 521 Multidimensional Signal Processing (3) *Marks* Multidimensional (MD) signals and systems, MD sampling theorem, sample dependence in higher dimensions, MD FIR filter design using windows and the McClellan transform, MD IIR filter stability and design. Current topics in MD signals and systems. Prerequisite: 442 or 518 or equivalent. Offered: odd years; A.

E E 522 Shannon Sampling and Interpolation Theory (4) *Marks* Historical overview of Shannon sampling theorem; fundamentals of the cardinal series; generalizations including those of Papoulis, Kramer, and Lagrange; effects of jitter, truncation and data noise on interpolation; continuous sampling restoration using prolate spheroidal wave functions and the Papoulis-Gerchberg algorithm. Prerequisite: 508. Offered: odd years; Sp.

E E 523 Computational Neural Networks (3) *Hwang* Fundamentals of computational neural networks from perspectives of system theory and electrical engineering applications: historical review, adaptive parameter estimation, nonlinear optimization, combinatorial optimization, learning rules, neural network models, data clustering and regression, pattern classification, speech recognition, image modeling, nonlinear control, principal component analysis, probability density estimation. Prerequisite: permission of instructor. Offered: Sp.

E E 524 Waves in Random Media II (4) *Tsang* Continuation of 575, treating recent developments and advanced topics in wave scattering by discrete random media, random rough surfaces, photon localization, and their engineering applications. Emphasis on multiple scattering field theory, polarimetry, transport theory, Monte-Carlo simulations and media characterization. Prerequisites: 572 and 575 or equivalent. Offered: even years; A.

E E 525 Acoustics in Engineering I (3) *Porter* Acoustic wave transmission, reflection, refraction, and diffraction in solids, liquids, and gases. Includes review of continuum mechanics and examples from electromechanical systems. Prerequisite: graduate standing in electrical or mechanical engineering or permission of instructor. Offered: jointly with M E 525; even years; W.

E E 526 Acoustics in Engineering II (3) *Porter* Continuation of 525. Material differs each year, covering such topics as scattering, moving media, ultrasonics, acoustic holography, optoacoustics, transducer propagation in anisotropic medium. Prerequisite: 525 or permission of instructor. Offered: jointly with M E 526; even years; Sp.

E E 527 Solid-State Laboratory Techniques (4) *Darling* Principles and laboratory techniques used in solid-state electronics research. Basic familiarity with practices and equipment used on-campus. Laboratory safety; materials handling, storage and disposal; clean room use; photoresist characteristics; mounting, bonding, and probing; wet chemical etching; vacuum evaporation; patterning of metal films using photoresist. Extensive laboratory with limited enrollment. Prerequisites: graduate standing and permission of instructor. Offered: Sp.

E E 528 Semiconductor Band Theory (4) *Pearsall, Tsang* Limits of classical physics, Schrödinger's equation, eigenvalues of simple systems; postulates of quantum mechanics, matrix methods, Dirac notation, operator methods; basic crystallography, real and reciprocal lattices, Brillouin zones, phonons, $E(k)$ diagrams, band structure calculations in solids; effective mass equation, spin-orbit splitting; application to quantum wells, superlattices, tunneling devices. Prerequisites: graduate standing or permission of instructor.

E E 529 Semiconductor Optics and Optical Devices (4) *Afromowitz, Pearsall, Yee* Perturbations of energy states in semiconductors; direct and indirect transitions; absorption processes; optical constants; absorption spectroscopy; radiative and nonradiative transitions; processes occurring at p-n junctions; junction devices; LEDs and lasers, photovoltaics; self-electro-optic effect device; modern laser structures. Prerequisite: graduate standing or permission of instructor. Offered: A.

E E 530 Optical Properties of Matter: A Quantum Mechanical Approach (4) *Pearsall, Tsang* Application of quantum mechanics principles and mathematical techniques to interactions of electrons, phonons, and photons. Electron states, transitions and selection rules; field quantization; coherent and incoherent interactions of radiation with matter. Prerequisite: graduate standing or permission of instructor. Offered: W.

E E 531 Semiconductor Device Physics and Modeling I (4) *Darling, Lauritzen, Yee* Physical principles in semiconductor devices. Generation, recombination, p-n junctions, MOS, metal-semiconductor and other interface structures. Carrier transport at low and high level injection levels. Numerical modeling used to demonstrate physical principles and basic device operation. Project using numerical modeling. Prerequisite: 482 or graduate standing. Offered: W.

E E 532 Semiconductor Device Physics and Modeling II (4) *Darling, Lauritzen* Compact modeling of semiconductor devices. Analytical models, standard SPICE models, lumped-charge models using an AHDL

language. Emphasis on diodes MOSFET's, BJT's, power devices, negative resistance devices. Application of models in circuit simulation. Design of a compact model using an AHDL language. Prerequisites: 531 or permission of instructor. Offered: odd years; Sp.

E E 533 Photodetectors and Photodetection (4) *Afromowitz, Pearsall, Yee* Includes both the device physics and signal processing aspects of photodetection. Photodiodes, photoconductors, photomultipliers, and solar cells are covered. Noise, signal to noise ratios and imaging considerations are also discussed. Prerequisite: 482 or graduate standing. Offered: odd years; W.

E E 534 Power Electronics (4) *Lauritzen* Detailed study of DC-to-AC inverters, pulse-width modulated and resonant DC-to-DC converter topologies; drive and protection circuits for efficient switching of semiconductor devices. Includes extensive computer-aided circuit simulation and power supply control. Prerequisite: graduate standing. Offered: odd years; W.

E E 535 Design of Digital Integrated Circuits and Systems (4) *Helms, Sechen, Soma, Somani* Design of digital VLSI, system specifications, architectures, synthesis, simulation, and layout. Covering CMOS technologies with minor emphasis on ECL, GaAs. Prerequisites: graduate standing in electrical or computer engineering, 476 or equivalent, or permission of instructor. Offered: Sp.

E E 536 Design of Analog Integrated Circuits and Systems (4) *Helms, Soma* Design of analog VLSI: specifications, design, simulation, layout. Covering CMOS and Bi CMOS technologies. Prerequisites: 433 or equivalent and graduate standing in electrical or computer engineering, or permission of instructor. Offered: W.

E E 537 Computation Methods for Circuit Analysis and Simulation (3) *Yang* Introduction to numerical algorithms and computer-aided techniques for the simulation of electronic circuits. Theoretical and practical aspects of important analyses: large-signal nonlinear DC, small-signal AC, nonlinear transient, and large-signal steady-state. Simulation concepts applied to the modeling and characterization of various electronic devices. Offered: A.

E E 538 Topics in Electronic Circuit Design (1-5) *Sechen* Topics of current interest in electronic circuit and system design. Course content varies from year to year, based on current professional interests of the faculty member in charge. Prerequisite: permission of instructor. Offered: A.

E E 539 Advanced Topics in Solid-State Electronics (1-5) Lectures or discussions of topics of current interest in the field of solid-state electronics for advanced graduate students having adequate preparation in solid-state theory. Subject matter may vary according to the interests of students and faculty. Prerequisite: permission of instructor. Offered: Sp.

E E 540 VLSI Testing (3) *Soma, Somani* VLSI testing and design-for-test techniques. Reliability predictions and characterizations for integrated circuits and systems. Circuits fabricated in 536 are tested as laboratory work. Prerequisites: 535, 536. Offered: Sp.

E E 541 Automatic Layout of Integrated Circuits (4) *Sechen* Examines the algorithms behind the commonly used physical design automation tools including: floorplanning, partitioning, placement, routing, compaction, and verification. Prerequisites: 371; CSE 373 or 326 or equivalent. Offered: A.

E E 543 Models of Robot Manipulation (3) *Hannaford* Mathematical models of arbitrary articulated robotic (or biological) arms and their application to realistic arms and tasks, including the homogeneous coordinate model of positioning tasks, the forward and inverse kinematic models, the Jacobian Matrix, and the recursive Newton-Euler dynamic model. Prerequisite:

linear algebra and graduate standing or permission of instructor. Offered: W.

E E 544 Advanced Robot Manipulation (4) *Hannaford* Continuation of the analysis of robot manipulation, considering kinematic redundancy, control of robot manipulators in contact with the environment, teleoperation, and grasping with multi-fingered hands. Students will perform a project and critique a research paper in the area of the project. Prerequisite: 543. Offered: Sp.

E E 546 Advanced Topics in Control System Theory (1-5) Topics of current interest in control system theory for advanced graduate students with adequate preparation in linear and nonlinear system theory. Prerequisite: permission of instructor. Offered when adequate enrollment develops prior to close of advance registration. Offered: AWSp.

E E 547 Neural Communication and Control in Biological Systems (3) *Pinter* Neural processing of the visual image and communication between levels of the central nervous system. Feedback and its role in movement by organisms. Description and analysis of the means by which electrochemical events generate, modulate, and demodulate neuronal signals, and the parallel interaction between these signals in transduction of images and other information. Prerequisite: advanced graduate standing or permission of instructor.

E E 548 Linear Multivariable Control (3) *Ly, Meldrum* Single loop feedback control theory; poles, zeros, Nyquist stability, performance, robustness of multivariable systems; multivariable control syntheses: Linear-Quadratic-Gaussian methods, loop transfer recovery, Youla parametrization, H-infinity techniques, parameter optimization design. Prerequisite: 584 or M E 575; 446 or A A 451 or M E 471 or equivalent. Offered: jointly with A A/M E 548; W.

E E 549 Estimation and System Identification (3) *Alexandro* Review of system models, model structure, model parametrization; review of stochastic processes; state estimation: observers, the Kalman-Bucy filter, numerical issues in filter design and implementation; system identification: linear regression, least squares, maximum likelihood, instrumental variable techniques. Prerequisites: E E 505 or AMATH 506 or STAT 506; recommended: 548 or A A 548. Offered: jointly with A A/M E 549; Sp.

E E 550 Nonlinear Optimal Control (3) *Vagners* Calculus of variations for dynamical systems, definition of the dynamic optimization problem, constraints and Lagrange multipliers, the Pontryagin Maximum Principle, necessary conditions for optimality, the Hamilton-Jacobi-Bellman equation, singular arc problems, computational techniques for solution of the necessary conditions. Prerequisite: graduate standing; recommended: A A 548 or E E 548. Offered: jointly with A A/M E 550; odd years; A.

E E 551 Power System Protection (4) *Ly, Venkata* The protection of electric power systems from overcurrents and overvoltages. Analysis and design of overcurrents resulting from faults, lightning induced or otherwise, or from excessive loads or power swings. Analysis and design of overvoltages resulting from switching transients or lightning. Principal concern is with relays and lightning arrestors as protection means. Prerequisite: 455 or equivalent. Offered: even years; A.

E E 552 Power Systems Dynamics and Control (4) *Damborg, El-Sharkawi* Advanced computer modeling and analysis of power systems. Application of modern systems and control theories. Prerequisites: 344 and 455 or permission of instructor. Offered: odd years; Sp.

E E 553 Power System Economics (4) *Christie, Damborg, Liu, Venkata* Economic structure of power systems. Problem formulation, optimization methods and programming for economic analysis of power system operation and planning. Economic dispatch, load

forecasting, unit commitment, interchange, planning and reliability analysis. Provides background to pursue advanced work in planning and operation. Prerequisite: graduate standing or permission of instructor. Offered: odd years; A.

E E 554 Large Electric Energy Systems Analysis (4) *Liu, Venkata* Deals with problems whose solution depends upon the inversion of sparse matrices that occur in the planning and operational studies of large interconnected energy systems. Application studies include system model development, state estimation, and load flow. Prerequisite: 456 or permission of instructor. Offered: even years; W.

E E 559 Special Topics in Electrical Energy Systems (1-5) *Damborg, El-Sharkawi, Liu, Venkata* Topics of current interest in electrical power and energy devices and systems. Content varies from year to year, based on current professional interests of faculty member in charge. Prerequisite: permission of instructor. Offered: AWSp.

E E 562 Artificial Intelligence for Engineers (3) *Holden, Shapiro* Covers main areas of artificial intelligence (AI) without need for extensive prerequisites. Programming languages for AI; problem solving; representations; control strategies; searching strategies; predicate calculus; rule-based deduction; goal-directed planning; knowledge-based systems. Prerequisites: 371 and CSE 374 or equivalents. Offered: W.

E E 563 Fault-Tolerant Computing (3) *Soma, Somani* Faults and their manifestation, issues, theory, and techniques of reliable systems design, testing, design for testability, self-checking and fail-safe circuits, coding techniques, system-level fault diagnosis, fault-tolerant communication, reliable software design, and evaluation criteria. Prerequisite: basic knowledge of digital systems design or permission of instructor. Offered: jointly with CSE 563; Sp.

E E 564 Parallel Computer Systems (3) *Hwang, Kim, Somani* Pipelined and vector processors; interconnection network for parallel processing, array and associative processors; multiprocessors; data-flow machines; systolic arrays and impact of the VLSI technology on parallel processors and processing. Prerequisites: 471, permission of instructor. Offered: A.

E E 565 Computer-Communication Networks I (3) *Meditch* Network architectures and protocols; Broadband-ISDN and Asynchronous Transfer Mode (ATM); performance modeling and analysis of packet-switched networks, digital switching systems. Prerequisite: 505 or equivalent. Offered: W.

E E 566 Computer-Communication Networks II (3) *Meditch* Local area, metropolitan area, satellite, and packet radio networks; routing algorithms for wide area networks; optimal design of packet-switched networks; congestion and flow control; fast packet switching; gigabit networks. Prerequisite: 565 or permission of instructor. Offered: Sp.

E E 568 Image Processing Computer Systems (4) *Haralick, Kim* All components of digital image-processing computer systems. Two-dimensional filtering and optimal filter design, as well as basic image processing operations. Selected advanced image processing topics. Individual student project. Prerequisite: permission of instructor. Offered: jointly with BIOEN 568; W.

E E 570 Antenna Engineering (3) *Kuga, Sahr* Theory of radiation; impedance characteristics and radiation patterns of thin linear antenna elements; antenna arrays; pattern synthesis; aperture antennas. Prerequisite: graduate standing or permission of instructor. Offered: odd years; A.

E E 571 Applications of Finite Difference and Finite Element Methods in Fields and Waves (4) *Chan* General principles of finite difference and finite element methods; finite difference and finite element discretization schemes; finite-difference time-do-

main method; Galerkin's method and functional minimization; construction of FEM matrices for electromagnetic problems; absorbing boundary conditions; sparse matrix solvers. Prerequisite: 572 or permission of instructor. Offered: odd years; W.

E E 572 Electromagnetic Theory and Applications I (4) *Ishimaru* Electromagnetic waves in layered media; complex waves, leaky and slow waves, waves in periodic structures, optical fibers, ionosphere and other guiding structures; transients and dispersive medium; waveguides and cavities; beam waves; eigenfunctions and eigenvalues. Prerequisite: graduate standing or permission of instructor. Offered: A.

E E 573 Electromagnetic Theory and Applications II (4) *Chan, Ishimaru, Kuga, Tsang* Scattering and absorption of electromagnetic waves, Rayleigh scattering, Born approximations, Green's functions, integral equations, anisotropic media, chiral media, T-matrix, high- and low-frequency approximations, saddle-point method, and variational principle. Prerequisite: 572 or permission of instructor. Offered: W.

E E 574 Electromagnetic Theory and Applications III (4) *Ishimaru* Geometric theory of diffraction, wave fluctuations, antenna noise temperature, radar planimetry, remote-sensing techniques and tomography applications, diffraction and inverse scattering, radon transform. Prerequisite: 573 or permission of instructor. Offered: Sp.

E E 575 Waves in Random Media (4) *Ishimaru, Tsang* Propagation and scattering of electromagnetic, optical, and acoustic waves in turbulence and random media, scattering from rough surfaces and randomly distributed particles. Atmospheric turbulence, fog, rain, smog, clear-air turbulence detection, remote sensing, terrain scattering, scattering from blood cells and tissues, scattering by ocean waves. Applications to atmospheric sciences, bioengineering, geoscience, ocean engineering. Prerequisite: graduate standing or permission of instructor. Offered: Sp.

E E 576 Image Understanding (3) *Haralick, Shapiro, Tanimoto* Overview of computer vision, emphasizing middle ground between image processing and artificial intelligence. Image formation, preattentive image processing, boundary and region representation, matching, case studies of vision systems. Prerequisites: 562 or CSE 573 and CSE 557, or equivalent, or permission of instructor. Offered: jointly with CSE 576; Sp.

E E 577 Mathematical Morphology (3) *Haralick* Theory of mathematical morphology and its application in various commercial, industrial, medical, and research applications. Contents include binary and grayscale morphologic dilation, erosion, opening, and closing, morphological sampling theorem, structuring element decomposition, thinning, skeletonizing, and relational shape description. Group project. Prerequisite: 568 or 576 or permission of instructor. Offered: jointly with CSE 577; A.

E E 578 Tomographic and Holographic Imaging in Acoustics and Electromagnetics (3) *Porter* Imaging problems including holographic shape determination, inverse source problems, diffraction tomography. Holographic tomography as a general imaging method for weak scatterer. Applications in ultrasound, geophysics, oceanography, optics, medicine. Methods that simplify experimental techniques and computer reconstructions. Prerequisite: graduate standing. Offered: even years; A.

E E 579 Advanced Topics in Electromagnetics, Optics, and Acoustics (1-5) Topics of current interest in electromagnetics, optics, and acoustics. Content varies from year to year, based on current professional interests of faculty member in charge. Prerequisite: permission of instructor. Offered: AWSp.

E E 580 Volterra and Wiener Nonlinear Systems (3) *Pinter* Methods of the Volterra and Wiener integral series for input-output description of nonlinear

systems. Generalization of the linear convolution integral to multiple convolutions, transforms of kernels, derivation of kernels from parametric (differential equation) models. Orthogonalization of series. Applications. Prerequisite: 335. Offered: even years; Sp.

E E 583 Nonlinear Control Systems (4) *Hannaford, Noges* Assessment of stability by: Phase Plane and Describing Function Methods, Circle and Popov Criteria, Lyapunov Criteria and construction of Lyapunov Functions by method of Kraasovskii and Lu're. Feedback linearization: input-state and input-output linearization. Prerequisite: 446 or 584 or permission of instructor. Offered: jointly with M E 583; odd years; Sp.

E E 584 Continuous and Discrete State Variable Methods (3) *Alexandro, Berg* Dynamic analysis of automatic control systems using state variable methods. Vector space concepts, modeling of physical systems in state space format, canonical forms for continuous and discrete time systems, controllability and observability, full-state feedback, state estimators, eigenstructure design. Prerequisite: graduate standing or permission of instructor. Offered: A.

E E 585 Digital and Sampled-Data Systems (3) *Alexandro, Berg* Sampling process and data holds, state variables and state transition equations for sampled-data systems, frequency domain and time domain analysis of sampled-data systems, stability of sampled-data systems, digital compensation of sampled-data systems. Prerequisite: 584. Offered: W.

E E 587 Vector Quantization and Data Compression (3) *Kim, Riskin* Introduction to data compression and information theory; vector quantization including theory, applications, design, performance criteria, variable rate systems, and reduced complexity structure including transform coding, wavelets, lossless compression algorithms, and applications of compression to images, speech, and video. Prerequisites: 505 or STAT 390 and computer programming experience. Offered: A.

E E 588 Advanced Laser Engineering (4) *Kuhn, Tsang* Electromagnetic principles and optical components important in laser engineering. Resonator design. Gain and laser rate equations (steady state and transient). Non-linear processes. The principles underlying common laser systems, including argon and krypton, diode pumped Nd:YAG, conventional and femtosecond pulse dye, and excimers. Prerequisite: 488 or permission of instructor. Offered: Sp.

E E 589 Advanced Topics in Sensors and Sensor Systems (4) Topics of current interest in sensors and sensor systems. Prerequisite: permission of instructor. Offered: alternate years; W.

E E 590 Advanced Topics in Digital Computers (2-5, max. 15) Lectures or discussions of topics of current interest in the field of digital systems. Subject matter may vary from year to year. Prerequisite: permission of instructor. Offered: AWSp.

E E 591 Robotics and Control Systems Colloquium (1, max. 3) Colloquium on current topics in robotics and control systems analysis and design. Topics presented by invited speakers as well as on-campus speakers. Emphasis on the cross-disciplinary nature of robotics and control systems. Offered: jointly with A/ACHEM E M E 591; AWSp.

E E 595 Advanced Topics in Communication Theory (1-5) *Azizoglu, Lytle* Extension of 507, 508, 518, 519, 520. Material differs each year, covering such topics as: detection theory, decision theory, game theory, adaptive communication systems, nonlinear random processes. Prerequisite: permission of instructor. Offered: AWSp.

E E 599 Selected Topics in Electrical Engineering (*) Prerequisite: permission of instructor. Offered: AWSp.

E E 600 Independent Study or Research (*) Offered: AWSpS.

E E 700 Master's Thesis (*) Offered: AWSpS.

E E 800 Doctoral Dissertation (*) Offered: AWSpS.

Industrial Engineering

G6-B Mechanical Engineering

The formal definition of industrial engineering, as adopted by the Institute of Industrial Engineers, is as follows: Industrial Engineering is concerned with the design, improvement, and installation of integrated systems of people, materials, information, equipment, and energy. It draws upon specialized knowledge and skill in the mathematical, physical and social sciences together with principles and methods of engineering analysis and design to specify, predict, and evaluate the results to be obtained from such systems.

Industrial engineering is set apart from other engineering disciplines by its broader scope. Industrial engineers are, by definition, specialists in designing and operating systems that make optimal use of resources when labor, materials, capital and technology are constrained. They deal with people as well as things, looking at the "big picture" of what makes society perform best—the right combination of human resources, natural resources, and man-made structures and equipment. Bridging the gap between management and operations, they deal with and motivate people as well as determine what tools should be used and how they should be used.

Industrial engineers are the "productivity people" who must provide leadership and integrate technology. They include the human factor in finding workable, effective solutions to production problems while retaining high standards of quality. Demand for industrial engineers has grown dramatically over the past two decades for one chief reason: the need for organizations to raise their levels of productivity through thoughtful, systematic applications. The profit-making organization must have high productivity in order to compete in the domestic and world market place. The non-profit organization must have high productivity in order to sustain its position as a useful service unit.

The goal of the undergraduate program is to provide a comprehensive education to prepare students for the profession. The first two years of the curriculum include pre-engineering courses, basic mathematics, natural science, engineering science, and humanities and social science. The industrial engineering curriculum focuses on system integration and methods to analyze, design, and improve manufacturing and service systems. The last two years are devoted to studies in the professional industrial engineering program: operations research including optimization and stochastic models; manufacturing engineering; production planning and plant layout; human factors and human interface technology; statistics and design of experiments; quality and reliability engineering; and a comprehensive senior design experience.

Undergraduate Program

Bachelor of Science in Industrial Engineering

Admission Requirements: The Bachelor of Science in Industrial Engineering (B.S.I.E.) degree is accredited by the Accreditation Board for Engineering and Technology. Students must apply for admission to the industrial engineering program. There are two categories of admission groups, as detailed below. UW students are eligible for the Early Admission Group (as

early as the end of the freshman year). UW and transfer students may apply in the Upper-Division Admission Group. Application deadlines are given in the *Industrial Engineering Advising Guide*.

(1) Early Admission Group (EAG): Open to students enrolled at the UW, who have completed 15 credits of mathematics at the level of MATH 124, 125, or 126 or equivalent; 10 credits of physical science courses plus the accompanying laboratory at the level of PHYS 121/131, 122/132, 123/133, CHEM 140, 141, 150, 151 or equivalent or above; and 5 credits of English composition. At least 15 of these 30 credits must have been completed at the UW prior to application.

(2) Upper-Division Admission Group (UAG): Students must have completed 63 credits applicable to the degree, including MATH 124, 125, 126; PHYS 121/131, 122/132, 123/133; CHEM 140, 141, 150, 151; and at least 5 credits of English composition. These are UW College of Engineering requirements for admission.

Program Requirements: Courses required for the B.S.I.E. degree include: a core of 38 credits of specified industrial engineering courses normally taken after admission to the program, 16 credits of technical electives including at least two classes from a specified short list, and 35 credits of fundamental courses representing several engineering disciplines. The B.S.I.E. degree also requires specific courses in mathematics, science, and oral and written communication, as well as 30 credits in humanities and social science.

The professional program consists of courses listed in the *Industrial Engineering Undergraduate Advising Guide*. Typical courses are statistics, operations research, engineering economy, human factors, workplace and work design, manufacturing processes, planning and scheduling, reliability engineering, simulation, quality control, and computer-integrated manufacturing.

To graduate, a student must earn a total of 180 credits with a minimum cumulative GPA of 2.00 in all engineering courses, with no grade below 1.00 in any of these courses. Courses counting toward the B.S.I.E. degree may not be taken on a satisfactory/not satisfactory basis. In addition, it is required that each student's program of study conform with the Accreditation Board for Engineering and Technology (ABET) requirement of at least 48 credits in engineering science and 24 credits in engineering design.

Correspondence and Information

Inquiries concerning the B.S.I.E. program should be directed to: Industrial Engineering Advising Office, G6B MEB, Box 352650, Seattle, WA 98195, (206) 543-5041.

Graduate Program

Faculty members in the industrial engineering program participate in offering the authorized interengineering degree option within the College-wide Master of Science in Engineering degree program. Students may earn a Ph.D. by enrolling in the mechanical engineering doctoral program and specializing in industrial engineering. Areas of faculty expertise include manufacturing, operations research, large-scale assembly, experimental statistics, production planning, quality control, reliability engineering, computer-integrated manufacturing, concurrent engineering, robotics, human factors, virtual reality, and human interface technology.

A proposal to offer the specific degrees of Master of Science in Industrial Engineering and Doctor of Philosophy in Industrial Engineering is now under review.

Correspondence and Information

Industrial Engineering Advising Office, G6B MEB, Box 352650, Seattle, WA 98195, (206) 543-5041.

Faculty

Director

Kailash C. Kapur

Professors

Furness, Thomas A. * 1989; PhD, 1981, University of Southampton (UK); display systems engineering, human factors, computer graphics.

Jorgensen, Jens E. * 1968, (Adjunct); DSc, 1969, Massachusetts Institute of Technology; systems analysis, manufacturing, automation and controls, forest engineering.

Kapur, Kailash C. * 1992; PhD, 1969, University of California (Berkeley); quality/reliability engineering, system design/optimization, total quality/reliability management.

Woo, Tony C. 1995; MSEE, 1974, PhD, 1975, University of Illinois; manufacturing systems, computer graphics and computational geometry.

Associate Professors

Barfield, Woodrow * 1987; PhD, 1986, Purdue University; interactive computer graphics, human factors in computer systems.

Douthwaite, Geoffrey K. 1954, (Emeritus); MSEE, 1963, University of Washington; rigid body mechanics, software design for engineering economics.

Drui, Albert B. * 1959, (Emeritus); MS, 1957, Washington University; industrial engineering, human factors.

Iverson, Scott Christian * 1983; PhD, 1974, University of Colorado (Boulder); health care systems, operations research and systems design and engineering.

Roberts, Norman H. * 1953, (Emeritus); PhD, 1958, University of Washington; reliability and probability theory.

Storch, Richard L. * 1975; PhD, 1976, University of Washington; ship vessel stability and safety, large scale assembly and manufacturing systems.

Wiker, Steven F. * 1993, (Adjunct); MS, 1981, George Washington University; MS, 1982, PhD, 1986, University of Michigan; ergonomics and human factors engineering.

Zabinsky, Zelda * 1985; PhD, 1985, University of Michigan; operations research, applications in industrial engineering, optimization with stochastic elements.

Assistant Professors

Heim, Joseph A. * 1993; PhD, 1990, Purdue University; computer simulations, manufacturing systems and manufacturing engineering.

Smith, Robert P. 1993; PhD, 1992, Massachusetts Institute of Technology; design methodology, manufacturing systems, concurrent engineering.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

IND E 237 Introduction to Manufacturing Systems (3) Storch Description of manufacturing systems. Includes discussion of current trends in manufacturing organizations including job-shop, assembly lines, and group technology, manufacturing inventory philosophies (just-in-time, MRP, OPT), work environment, and work simplification. Offered: Sp.

IND E 285 Product Dissection (3) Kumar, Jorgensen Examination of the way products and machines work, their physical operation, the manner in

which they are constructed, and the interaction between design, materials, and manufacture. Laboratories involve dissection and assembly of several common industrial and consumer products by student teams. Offered: jointly with M E 295; Sp.

IND E 316 Regression Analysis and Design of Experiments (3) *NW Barfield, Kapur* Introduction to the analysis of data from planned experiments. Analysis of variance and regression analysis with applications in engineering. Prerequisite: ENGR 315. Offered: jointly with STAT 316.

IND E 324 Engineering Applications of Linear Programming (3) *Iverson, Zabinsky* Optimization of linear systems, mathematical model design, simplex methods, primal-dual algorithms, parametric programming, network theory, integer and goal programming and game theory. Design aspects of models with applications involving transportation, allocation, and total industrial engineering systems. Prerequisites: MATH 308 and ENGR 142. Offered: A.

IND E 325 Nonlinear Programming and Stochastic Models (3) *Iverson, Zabinsky* Nonlinear optimization and stochastic systems analysis to industrial engineering problems. Topics include: nonlinear programming, dynamic programming, geometric programming, and Markov chains, queueing theory and queueing applications. Prerequisites: 324 and ENGR 315. Offered: W.

IND E 326 Methodology of Operations Research (3) *Iverson* Fundamental concepts of mathematical systems theory and decision theory. Application of general systems approach for specification of requirements, analysis, design, implementation of industrial engineering, and information systems. Generalized techniques and applications common to industrial and mechanical engineers. Class project concerning analysis of large-scale systems problem utilizing operational research. Prerequisite: 325.

IND E 351 Human Factors in Design (3) *Barfield* Engineering considerations of the abilities and limitations of the human aspect in the design of operational systems and components. Functional, psychological, physiological, and environmental considerations. Prerequisite: ENGR 315.

IND E 392 Concurrent Engineering (3) *Smith* Focus on the need for and the tools of concurrent engineering in all engineering disciplines. Functional and cross-function organizations, new product development, market-need identification and design for manufacturing are explored. Prerequisite: 295, CER E 401, CHEM E 485, CIVE 306, E E 331, M E 304, M E 295, or MET E 421. Offered: jointly with M E 392.

IND E 421 Statistical Quality Control (3) *Kapur, Storch* Design of quality-control and assurance systems. Statistical Process Control (SPC) design and implementation. Control charts for attributes and variables. Process capability analysis and process improvement techniques. Statistical tolerance design. Quality management and recent developments. Prerequisite: ENGR 315. Offered: A.

IND E 424 Simulation (4) *Heim* Discrete-event simulation methodology emphasizing model formulation and construction with modern simulation languages and environments, statistical basis for evaluating model results, design and management of simulation projects. Application to retail, manufacturing and service industries. Prerequisite: 325, ENGR 142, and ENGR 315.

IND E 426 Reliability Engineering and System Safety (3) *Kapur* Reliability and system safety measures. Life distributions and their applications in reliability. System reliability models. Design by reliability and probabilistic design. Reliability and safety analysis through FMECA and FTA. Reliability estimation and measurement by testing for binomial, exponential, and Weibull distributions. Prerequisite: ENGR 315. Offered: Sp.

IND E 430 Manufacturing Scheduling and Inventory (4) *Heim, Storch* Manufacturing scheduling and inventory control for different work organizations. Coverage of workforce scheduling, job- and flow-shop scheduling and order release, production line balancing, MRP II, Lean Production, and data management. Particular attention to computer-based aspects of management and scheduling for manufacturing and service industries. Prerequisites: 325 and ENGR 142 or equivalent.

IND E 431 Computer Integrated Manufacturing (4) *Heim* Design and control of computer-based production systems. Focus on selection and integration of flexible manufacturing technology, computer hardware, application and operating system software, data communication networks, data management systems. Laboratory assignments concentrate on programming and integration of system components. Current literature and recommended texts used as reference sources. Prerequisite: 237 and ENGR 142 or equivalent.

IND E 433 Introduction to Computational Manufacturing (3) *Woo* Fundamentals in science of "making things". Analogies between software engineering and manufacturing drawn, leading to study of potentials, creation of flows, and their morphologies. Equilibrium, optimization, and path problems studied in context of production and its economics. Visualization of the geometry by Mathematica employed. Prerequisites: 237 and 325 or equivalent.

IND E 439 Plant Layout and Material Handling (4) *Storch* Design of new or expanding industrial facilities. Consideration of work organization and layout. Study of basic design of plant systems, including plumbing, electrical, HVAC, illumination, acoustics, and waste handling. In depth coverage of material handling system design and equipment choices.

IND E 455 User Interface Design (3) Design oriented to cover fundamentals of user interface design; models on human computer interaction, software psychology, input devices, usability, cognitive and perceptual aspects of human-computer interaction, advanced interface, and research methodologies are discussed. Prerequisites: ENGR 315 and 316 or equivalent, or permission of instructor. Offered: jointly with T C 455.

IND E 494 Design in the Manufacturing Firm (4) *Smith* Engineering design in manufacturing firms is presented. Topics include design methodology, concurrent engineering, and project management. Focus on the relationship between product design and manufacturing (design for production and assembly). Prerequisites: 237, ENGR 333, M E 304, and senior standing. Offered: W.

IND E 495 Industrial Engineering Design (3) *Smith* Capstone senior design project involving identification and synthesis of industrial engineering skills. Students apply their knowledge of industrial engineering to actual industrial problems. Prerequisite: 494. Offered: Sp.

IND E 496 Technology-Based Entrepreneurship (3) *Heim* Concentrates on hands-on aspects of innovation and entrepreneurial enterprise development. Examines relationships between innovation, iterative prototyping, and marketing testing. Students identify market opportunities, create new technology-based products and services to satisfy customer needs, and construct and test prototypes. Prerequisites: ENGR 250 and one design course. Offered: jointly with M E 496.

IND E 498 Special Topics in Industrial Engineering (1-5, max. 9) Lecture and/or laboratory. Prerequisite: permission of instructor.

IND E 499 Special Projects (2-5, max. 9) Prerequisite: permission of department Chairperson.

Courses for Graduates Only

IND E 510 Applications of Optimization in Engineering Design (3) *Zabinsky* Discussion of issues arising in applications of optimization to engineering design. Emphasis on formulating problems and selecting appropriate solution techniques. Random search methods for problems otherwise computationally intractable. Individual projects in engineering optimal design. Prerequisites: AMATH/MATH/IND E 515 and MATH 328 or permission of instructor. Offered: jointly with AMATH 510.

IND E 511 Management Decision Models (3) *Iverson* Quantitative approaches, using decision models. Topics include elements of a decision, theory of optimal decisions, resource allocation, simulated decision making, decisions under uncertainty, risk and pressure, utility theory, and game theory. Projects in manufacturing, community health, construction, and urban development. Prerequisites: 324, ENGR 250 and ENGR 315 or permission of instructor.

IND E 513 Linear Optimization Models in Engineering (3) *Zabinsky* Advanced formulation techniques to expand applications of linear programming to large-scale models. Appreciation of role of optimization models in engineering applications through introduction of techniques such as decomposition. Individual engineering projects. Prerequisites: 324 and MATH 308 or permission of instructor.

IND E 515 Fundamentals of Optimization (5) Maximization and minimization of functions of finitely many variables subject to constraints. Basic problem types and examples of applications; linear, convex, smooth, and nonsmooth programming. Optimality conditions. Saddlepoints and dual problems. Penalties, decomposition. Overview of computational approaches. Prerequisites: MATH 309, 328, or equivalents. Offered: jointly with AMATH/MATH 515.

IND E 521 Quality Control in Manufacturing (3) *Kapur, Storch* Design of quality control systems in manufacturing. Use of advanced statistical process controls, sampling inspection techniques, process capability, and other statistical tools. Also included are vendor sourcing and control tools, methods for establishing specifications and tolerances, quality function deployment, and other quality control techniques. Prerequisite: graduate standing.

IND E 524 Robust Design and Quality Engineering (3) *Kapur* Introduction to robust design and quality engineering. Applications of design of experiments for product and process design optimization. Experimental design using orthogonal arrays and linear graphs. System models using Chebyshev's orthogonal polynomials. Robustness in design and quality improvement for complex systems including Taguchi methods for quality engineering. Prerequisite: 316 or equivalent.

IND E 526 Reliability in Product Design and Testing (3) *Kapur* Product assurance including reliability and quality engineering. Reliability design, measurement, and optimization. Advanced topics in probabilistic design. Design of reliability test plans and analysis of test data. Design of reliability programs and their management. Prerequisite: graduate standing.

IND E 531 Computer Integrated Manufacturing (3) *Heim* Design and analysis of advanced manufacturing systems from a strategic as well as technological perspective. Focus on information generation, management, and coordination aspects of complex manufacturing organizations. Examination of system integration alternatives and consequences for relationships with customers and suppliers. Prerequisite: 431 or equivalent.

IND E 535 Engineering Simulation (3) *Heim* Advanced applications of discrete event, continuous, and combined discrete-continuous simulation modeling, detailed examination of fundamental computer programming concepts underlying the design and de-

velopment of simulation languages, variance reduction techniques, and output analysis for various engineering, service systems, and manufacturing applications. Prerequisite: 424 or equivalent.

IND E 538 Large Assembly Manufacturing Systems (3) *Storch* Presents principles of group technology, zone construction, product-oriented work breakdown structure. Application to shipbuilding, aircraft, rail-car, and truck manufacture. Techniques of production planning, scheduling and control, organization, and plant layout, as well as the role of the computer, are studied in detail. Prerequisite: graduate standing.

IND E 541 Human Factors Engineering (3) *Barfield* Focus on three-dimensional spatialized sound, stereoscopic displays, and human-computer interaction. Some discussion on hardware for producing stereoscopic images and computer synthesized spatialized sound and/or auditory and visual modalities as related to interface design. Prerequisites: 351 or PSYCH 335 and one course in design of experiments.

IND E 542 Haptic Interface Design (3) *Barfield* Research oriented seminar focusing on tactile and kinesthetic modalities of haptic interface design, including tactile displays, the kinesthetic sense, input devices, and virtual environments. Hardware for producing haptic interfaces and psychological literature related to tactile and kinesthetic modalities as related to interface design. Prerequisite: 541 or permission of instructor.

IND E 543 Virtual Interface Technology (1/3) *Furness* Explores advanced concepts and technologies for interfacing humans to complex machines, with focus on virtual interfaces. Interface design principles reviewed from psychological and technological perspectives. Hardware, software, and mindware aspects of virtual interfaces investigated. Applications postulated and designed. Prerequisite: graduate standing in College of Engineering or permission of instructor.

IND E 544 Virtual World Development (3) *Furness* Software implementation, physiological and cognitive constraints, and the mathematics and philosophy of inclusion. Development of software tools, editing and interaction techniques, disposition of virtual world entities, nature of space, situated knowledge, divergent models for multiple participants, experiential mathematics, cyberspace. Cultural, legal, moral, ethical issues. Prerequisite: 543 or permission of instructor.

IND E 554 Environmental Decision Modeling (3) *Iverson* Current environmental issues concerning industrial engineers and the decision modeling techniques appropriate to industrial ecology, conflict resolution, simulation, and assessment of impacts. Modeling techniques applied to topics ranging from stress management and quality improvement in the workplace to the principles of sustainable resource management. Prerequisite: 511 or permission of instructor.

IND E 555 Health Systems Engineering (3) *Iverson* Applications of industrial engineering techniques, processes, and methodologies to the operations and management decisions of hospitals and to policy analysis in health care systems, including quality improvement, decision analysis, system dynamics modeling, and simulation. Prerequisite: 511 or permission of instructor.

IND E 568 Occupational Biomechanics (4) *Wiker* Lectures and laboratories address human occupational biomechanical and physiological limits and measurement, analysis, and modeling techniques that are used by ergonomists for design of safe, healthful, and productive physical work. Prerequisites: 566 or permission of instructor. Offered: jointly ENV H 569, Sp.

IND E 591-, 592-, 593- Seminar (0,0,-1-) Credit/no credit only. Prerequisite: graduate standing in Industrial Engineering or permission of instructor.

IND E 594 Management of Engineering Design (3) *Smith* Examination of methods used and issues explored in research on engineering design management, a technical and organizational activity practiced in, and crucial to the financial success of, almost every industry.

IND E 599 Special Topics In Industrial Engineering (1-5, max. 9) Written report required. Prerequisite: permission of supervisor.

Materials Science and Engineering

302 Roberts

Materials science and engineering is an interdisciplinary field that addresses the scientific fundamentals of materials, their processing, and their engineering design for technological applications. Basic principles of chemistry and physics are applied to provide an understanding of the structure of materials and the manner in which the structure determines the properties. Scientific processing is then applied to yield the necessary properties, which then can be integrated with, and designed to accommodate, the needs of modern technology.

The general goals of the undergraduate programs in the department include the following:

1. To provide educational programs of the highest quality in materials science, metallurgical engineering, ceramic engineering, electronic materials, and composites materials. To educate our students in the application of basic and engineering sciences to the solution of problems related to the processing, properties, and utilization of materials. To prepare students for entrance into professional careers or into graduate studies in materials science and materials engineering.
2. To expose our students to design concepts and societal issues (e.g., ethical, economic, environmental) as part of the curriculum. To instill in our students the importance of human values and to develop sensitivity to social problems and ways in which technology can provide a basis for solution to these problems. To provide industrial experience as part of the educational process.
3. To provide our students with a sound basic science foundation together with educational breadth in subjects outside of their major to help them function as productive members of the engineering profession and of society in general.
4. To develop in our students the ability to communicate effectively, both orally and in writing, the concepts and results of engineering investigations to both technical and non-technical audiences.
5. To promote an awareness of and pride in the professional image of materials engineering, to encourage participation in professional societies, and to develop an awareness of the professional responsibilities of engineers in general.
6. To participate actively in programs designed to attract and retain underrepresented minority students in order to enhance the diversity of the student body.
7. To provide educational services in the materials area for the College of Engineering, the University of Washington and to the state of Washington, recognizing that materials is a subject area of interest to other engineering disciplines, to industry, and to society in general.

The faculty of the Department of Materials Science and Engineering recognizes that a strong graduate program is an essential component of a balanced educational effort in materials. The department's graduate programs in materials science and engineering are

designed to build on and enhance the educational experience imparted in its two undergraduate programs, metallurgical engineering and ceramic engineering. Therefore, a related department goal is to provide coordination and balance between the undergraduate and graduate degree programs, and to ensure that each program is allocated the resources necessary to meet its goals.

Within the overall field of materials science and engineering, students are offered both a broad core and in-depth options. The broad core provides the needed background and understanding of all types of engineering materials, including metals, ceramics, electronic materials and composites.

Ceramic materials are resistant to high-temperatures, chemically durable, strong, and rigid. The ceramic engineering program provides students with an understanding of the chemical, electrical, optical, mechanical, and thermal properties of ceramics; of processing methods and their effects on the structure and properties; and of the feasibility and economics of manufacture of ceramic materials for engineering applications. The study of electronic and optical materials is also available in the program.

Metallurgical engineering is concerned with the processing, fabrication, and utilization of metals, alloys, and other engineering materials. Extractive metallurgy relates to the processing and refining of metals and their compounds. Physical metallurgy is concerned with the structure and properties of materials, the development of new materials with improved properties, and the application and performance of materials in modern engineering systems and design. The study of electronic and optical materials is also available in the program.

Undergraduate Program

Bachelor of Science in Ceramic Engineering

Admission Requirements: Students may apply for admission into the ceramic engineering program as described below. Application information, forms and deadlines are available from the department office along with a detailed advising guide for the program. Students are urged to consult with a department adviser early in their University career regarding plans of study in preparation for their major and for assistance in preparing their application for admission to the program.

(1) Early Admission Group (EAG): Open to students enrolled at the UW who, prior to admission, have completed 15 credits of mathematics at the level of Math 124, 125, 126 or above; 10 credits of physical science courses plus the accompanying labs at the level of Physics 121/131, 122/132, 123/133 or CHEM 140, 141, 150, 151 or above; and 5 credits of English composition. At least 15 of these 30 credits must have been completed at the UW prior to application. The cumulative GPA in these courses must be 2.50 or higher. Applications for early admissions are accepted for autumn quarter only.

(2) Upper-Division Admission Group (UAG): Students must have completed 64 credits at the UW or their transfer equivalent, with a cumulative GPA of 2.00 or higher and a minimum grade of 2.0 in specific courses. Prior to admission, students must have completed MATH 124, 125, 126, and 307; CHEM 140, 141, 150, 151; PHYS 121/131, 122/132; 5 credits of English composition; plus ENGR 142 and 170. Strongly recommended before admission are ENGR 210, 220, and 231. Applications for admission are accepted autumn, winter, and spring quarters.

Because resources are limited, admissions are competitive and attaining the minimum GPA does not guarantee admission. Continuation in the program is subject to the policy published in the advising guide.

Graduation Requirements: Students must complete the College of Engineering General Education requirements and select the following courses from the Engineering Fundamentals category: ENGR 123, 170, 210, 215, 220, 250. The upper-division professional program consists of 77 credits of required courses including courses in materials structure and properties, analysis techniques, and thermodynamics, plus a 4-credit senior problem or design alternate. Courses in ceramic processing and properties are designed to develop technical expertise applicable to modern ceramic engineering practice. Additional courses must be completed for a total of 192 credits for the B.S.Cer.E. degree.

A variety of financial aid is available to students in ceramic engineering. In addition to need-based aid provided through the University's Office of Student Financial Aid, companies and individuals with interest in developing ceramic engineering students have provided scholarships for students at all levels who have been admitted to the program. Specific information and application forms are available in the department office, 302 Roberts.

Bachelor of Science in Metallurgical Engineering

Admission Requirements: Students may apply for admission in to the metallurgical engineering program as described below. Application information, forms and deadlines are available from the department office along with a detailed advising guide for the program. Students are urged to consult with a department adviser early in their University career regarding plans of study in preparation for their major and for assistance in preparing their application for admission to the program.

(1) Early Admission Group (EAG): Open to students enrolled at the UW who, prior to admission, have completed 15 credits of mathematics at the level of Math 124, 125, 126 or above; 10 credits of physical science courses plus the accompanying labs at the level of Physics 121/131, 122/132, 123/133 or CHEM 140, 141, 150, 151 or above; and 5 credits of English composition. At least 15 of these 30 credits must have been completed at the UW prior to application. The cumulative GPA in these courses must be 2.50 or higher. Applications for early admission are accepted for autumn quarter only.

(2) Upper-Division Admission Group (UAG): Students must have completed 64 credits at the UW or their transfer equivalent, with a cumulative GPA of 2.00 or higher and a minimum grade of 2.0 in specific courses. Prior to admission, students must have completed MATH 124, 125, 126, and 307; CHEM 140, 141, 150, 151; PHYS 121/131, 122/132; 5 credits of English composition; plus ENGR 142 and 170. Strongly recommended before admission are ENGR 210, 220, and 231. Applications for admission are accepted autumn, winter, and spring quarters.

Because resources are limited, admissions are competitive and attaining the minimum GPA does not guarantee admission. Continuation in the program is subject to the policy published in the advising guide.

Graduation Requirements: Students must complete the College of Engineering General Education requirements and select the following courses from the Engineering Fundamentals category: ENGR 170, 210, 215, 220, 250. Remaining lower-division courses are selected from among those recommended. Metallurgy majors must complete a 6-credit, upper-level science requirement, chosen with the adviser's approval. Recommended courses to fulfill this requirement include CHEM 223, 224; 350, 351; 455, 456; or PHYS 224, 225. 14 credits of technical electives are required, of which 3 credits are to be in design. The design and technical elective courses must meet standards specified in the advising guide. A 4-credit senior problem or design alternate is required. In addition to the College and departmental requirements specified above, addi-

tional courses must be completed to satisfy the minimum graduation requirement of 192 credits.

A variety of financial aid is available to students in metallurgical engineering. In addition to need-based aid provided through the University's Office of Student Financial Aid, companies and individuals with interest in developing metallurgical engineering students have provided scholarships for students at all levels who have been admitted to the program. Specific information and application forms are available in the department office, 302 Roberts.

Minors

Students majoring in other departments at the UW can receive a minor in materials science and engineering by satisfying the following requirements.

Minor Requirements: 30 credits to include MSE 305 (4 credits), 314 (4), 315 (4), 317 (1), 318 (1) and an additional 16 credits in an approved course sequence with a minimum grade of 2.0 in each. The minor program course sequence is offered with specializations in ceramics, composites, electronic materials, or metallurgy. The required/recommended courses for each one of these specializations are different. Contact the department for further details.

Graduate Program

Thomas F. Archbold, Graduate Program Coordinator

The Department of Materials Science and Engineering offers programs of study leading to the degree of Master of Science in Materials Science and Engineering with defined options in ceramic engineering, metallurgical engineering, and materials science. The Doctor of Philosophy program is offered with defined pathways in ceramic engineering, metallurgical engineering, and materials science.

The materials science option or pathway is a course of study that combines the basic elements of understanding ceramics, metals, polymers, composites and electronic materials. Many specialized courses, including engineering fracture mechanics, semiconductor devices, and polymer chemistry, may be taken in other departments to provide a broad, yet basic, materials study program.

Ceramic engineering graduate programs are designed to develop a fundamental understanding of the physical, chemical, and structural relationships that influence the properties and applications of ceramic materials. Processing, the development of microstructure, and the relationships of microstructure to properties are considered from a basic viewpoint that is applicable to a broad range of materials.

Graduate programs in metallurgical engineering encompass a variety of courses and research programs that are related to the physical and chemical aspects of metals, alloys, and related engineering materials. Programs in the physical metallurgy and materials science areas include the structure and properties of alloys, phase transformations, biomaterials, lattice defects, the optical properties of nonmetallic solids, failure analysis, x-ray diffraction, and the mechanical behavior of materials. Programs in the area of extractive metallurgy and minerals processing include metallurgical thermodynamics, rate phenomena, extractive process design, and carbothermic reduction processes.

In addition, the department is authorized to supervise an option in materials science and engineering that leads to the College of Engineering Master of Science degree. This degree program is intended to accommodate students who have a strong science background but lack an undergraduate engineering degree. The required courses are the same for all of the above degrees. Students with deficiencies in their intended area of engineering specialization may be required to

take undergraduate courses in addition to the normal graduate course requirements.

Master of Science in Materials Science and Engineering and Master of Science

For these master's degrees, a minimum of 27 credits of course work and the satisfactory completion of an M.S. thesis research problem are required. Fifteen of the course credits are specified to include courses on thermodynamics, crystal structure, imperfections, microstructure and phase transformations, and graduate seminar. Other courses may be required for specific program options. The residence and grading requirements follow those of the Graduate School.

Doctor of Philosophy

Students who have completed one year of graduate work must take the Ph.D. qualifying examination the next time it is offered to determine whether the faculty will advise continued study proceeding to the General Examination for the degree of Doctor of Philosophy. A critical examination of the applicant's complete academic record, recommendations, and proposed course of study will be pertinent to this decision. In addition to course work, each student is required to pass the General Examination, which is sufficiently comprehensive to demonstrate the student's ability to deal with broad aspects of materials science, as well as with a specialized subject area. Proficiency in basic research is of paramount importance. Each prospective candidate is required to present a written dissertation that makes an original and independent contribution to knowledge of the student's field of specialization.

Research Facilities

The research laboratories in the Department of Materials Science and Engineering are well equipped for a variety of research endeavors. Facilities include equipment for electron and optical microscopy, x-ray diffraction, high-temperature heat treatment and mechanical testing, specialized processing equipment, including hot and cold isostatic presses, nitrogen reaction furnaces, and automated TGA, DTA analysis systems. Equipment for analyses of particle size, surface area, and pore size is also available. Students have liberal access to the University computing facilities.

Financial Aid

A limited number of teaching assistant and research assistant appointments are available. Early application and direct correspondence or interviews with faculty members who may have open positions on research projects are encouraged. Requests for application forms and financial aid should be directed to the graduate program coordinator.

Correspondence and Information

Graduate Program Coordinator
302 Roberts, Box 352120

Faculty

Chair

Thomas Gaines Stoebe

Professors

Allan, G. Graham * 1966, (Adjunct); PhD, 1956, University of Glasgow (UK); DSc, 1971, University of Strathclyde (UK); fiber and polymer science, creativity and innovation.

Anderson, Donald 1947, (Emeritus); BS, 1941, University of Illinois; mining and exploration.

Archbold, Thomas F. * 1961; MS, 1957, PhD, 1961, Purdue University; physical metallurgy corrosion, diffusion, oxidation, metal failures.

Fischbach, David B. * 1969, (Emeritus); PhD, 1955, Yale University; structure and properties of carbons, graphite, other non-oxide ceramics, and composite materials.

Ghose, Subrata * 1972, (Adjunct); PhD, 1959, University of Chicago; mineralogy.

Inoue, Kanryo * 1993, (Research); PhD, 1977, Osaka City University (Japan); mechanical and physical properties, phase transformations, smart materials.

Kalonji, Gretchen * 1990; PhD, 1982, Massachusetts Institute of Technology; crystalline defects, computer simulation, rapid solidification of ceramics.

Pearshall, Thomas P. * 1989; PhD, 1973, Cornell University; physics of semiconductors and the technology of semiconductor devices.

Polonis, Douglas H. * 1955, (Emeritus); PhD, 1955, University of British Columbia (Canada); physical metallurgy, phase transformations, mechanical properties of materials.

Rao, Y. Krishna * 1976; PhD, 1965, University of Pennsylvania; chemical and extractive metallurgy, ore dressing.

Rogers, James W. Jr. * 1990, (Adjunct); PhD, 1979, University of Texas (Austin); surface chemistry and engineering, applications to thin film deposition.

Scott, William D. * 1965; PhD, 1961, University of California (Berkeley); mechanical properties of ceramics, composites, twinning in alumina, optical microscopy.

Stoebe, Thomas Gaines * 1966; PhD, 1965, Stanford University; physics of solids, optical properties, thermoluminescence, compound semiconductors.

Taya, Minoru * 1986, (Adjunct); PhD, 1977, Northwestern University; composite materials, elasticity and plasticity, impact physics, fracture theory.

Whittemore, Osgood J. * 1964, (Emeritus); MS, 1941, University of Washington; ceramic processing, refractories, industrial minerals.

Associate Professors

Bordia, Rajendra Kumar * 1991; PhD, 1986, Cornell University; processing and mechanical properties of ceramics, polymer and ceramic composites.

Jónsson, Hannes * 1988, (Adjunct); PhD, 1985, University of California (San Diego); computer simulations and scattering calculation in materials and surface science.

Miller, Alan D. * 1967, (Emeritus); PhD, 1967, University of Washington; instrumental analysis, high-temp equilibria processing, electronic ceramics, cooperative education.

Ohuchi, Fumio * 1992; PhD, 1981, University of Florida; nucleation and growth of thin film materials, surface science, glass, device applications.

Sarikaya, Mehmet * 1984; PhD, 1982, University of California (Berkeley); nanoscopic (TEM), imaging, diffraction and spectroscopy, phase transformations, biocrystallization.

Stang, Robert George * 1973; PhD, 1972, Stanford University; mechanical behavior, elastic and plastic deformation, and high-temperature creep in materials.

Assistant Professors

Brush, Lucien N. * 1990; PhD, 1988, Carnegie-Mellon University; computational modeling of solidification, modeling studies of materials processing.

Dogan, Fatih * 1990, (Research); PhD, 1989, Technische Universität (Germany); ceramic processing; electronic and magnetic materials, crystal growth of high T_c superconductors.

Flinn, Brian D. * 1991, (Research); PhD, 1991, University of California (Santa Barbara); structure-processing-property relationships in structural materials.

Haile, Sossina M. * 1993; PhD, 1992, Massachusetts Institute of Technology; ion transport in solids, crystal growth, x-ray diffraction.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

Ceramic Engineering

CER E 336 Ceramic Engineering Excursion (1) Plant inspection trip. Credit/no credit only. Offered: A.

CER E 401 Equipment and Plant Design (3) The design process and its application in ceramic engineering. Design projects. Prerequisite: MSE 330. Offered: Sp.

CER E 411 Vitreous State (4) Chemistry and physics of glass, glazes, and porcelain enamels; structure, properties and processing of vitreous materials. Prerequisite: MSE 316 or permission of instructor. Offered: Sp.

CER E 413 Physical Ceramics: Mechanical Properties (3) Mechanical properties, elasticity, strength, thermal shock, and high temperature effects relative to structural design. Fracture mechanics and notch sensitivity of brittle materials. Environmental effects, plastic flow, and high temperature deformation. Prerequisite: ENGR 220. Offered: A.

CER E 414 Electrical Properties of Ceramics (3) Ionic and electronic conduction in crystalline and non-crystalline inorganic solids. Dielectric and ferroelectric behavior, magnetic properties of ferrimagnetic materials, optical properties of dielectrics. Undergraduate ceramic engineering majors must take 415 concurrently. Prerequisite: E E 306. Offered: W.

CER E 415 Electrical Properties of Ceramics/Laboratory (1) Ionic and electronic conduction in crystalline and noncrystalline inorganic solids. Dielectric and ferroelectric behavior, magnetic properties of ferrimagnetic materials, optical properties of dielectrics. Prerequisite: concurrent enrollment in 414. Offered: W.

CER E 416 Mechanical Properties Laboratory (1) Measurements of the mechanical properties of ceramics: strength, fracture, toughness, thermal shock damage. Use of Weibull statistics to characterize strength and failure. Prerequisites: 413 which may be taken concurrently, ENGR 220. Offered: A.

CER E 420 Colloidal Ceramics (3) Properties and surface chemistry of ceramic colloids. Topics include absorption, adsorption, gels and their contributions to cementitious bonding, ion exchange, rheological properties, and analytical techniques applicable to these studies.

CER E 421 Ceramic Processing (4) Technology of ceramic fabrication processes. Material characterization at processing stages for control. Laboratory study of all operations in the manufacture of selected ceramic products. Offered: A.

CER E 470 Refractories (3) Chemical and mineralogical composition; processing methods; thermal, physical, and chemical properties and tests; application in high-temperature processes.

Materials Science and Engineering

MSE 300 Introduction to Materials Science and Engineering (2) Introduces the materials field to new department majors. Examples are drawn from ceramics, metals, polymers, electronic materials and composites. Structure/properties/manufacturing/design relationships are emphasized. Offered: A.

MSE 305 Phase Equilibria (4) Phase equilibria in ceramic and metal systems of one, two, and three components. Use and determination of phase equilibrium diagrams. Prerequisite: 322 or ENGR 260. Offered: W.

MSE 314 X-Ray Diffraction and Crystallography (4) Theory and practice of x-ray diffraction with applications to materials systems. Principles of crystal symmetry, reciprocal lattice, and stereographic projections. Offered: A.

MSE 315 Kinetic Processes and Transformations in Materials (4) Applications of thermodynamic and kinetic principles to the study of transformations and reactions in engineering materials. Thermal activation and rate equations; solid state diffusion; nucleation and growth; phase transformations; examples of important reactions including crystal growth, recrystallization, precipitation in solids, sintering, and devitrification. Prerequisites: 314, ENGR 170. Offered: W.

MSE 316 Mechanical Behavior of Materials (4) Influence of structure on the mechanical properties of ideal and real solids. Mechanical behavior in metallic and ceramic systems. Prerequisite: 315. Offered: Sp.

MSE 317 Physical Materials Laboratory (1) Experimental techniques, computer applications elements of optical microscopy. Offered: A.

MSE 318, 319 Physical Materials Laboratory (1,1) Experimental work to accompany 315, 316. Microstructure development and mechanical behavior of inorganic materials. Offered: W, Sp.

MSE 322 Thermodynamics in Materials Systems (4) Quantitative applications of thermodynamics to systems of interest to metallurgical and ceramic engineers. Detailed review of thermodynamic quantities and equations of state. Offered: A.

MSE 330 Processing of Inorganic Materials (4) Fundamental and technological aspects of processing of metals, ceramics and semiconductor materials; transport processes relevant to materials processing; low and high temperature routes for refining materials; liquid state and vapor phase processing inorganic materials. Offered: Sp.

MSE 399 Introduction to Research and Design (1) Research planning and design in materials science and engineering introduced by the faculty to facilitate student selection of senior project topic. Offered: Sp.

MSE 421 Thermodynamics of Solids (3) Applications of thermodynamics to the solid state. Statistical interpretation of entropy. Heterogeneous equilibria. Theories of solutions. Thermodynamics of surfaces and of defects in solids. Prerequisite: 322 or equivalent. Offered: W.

MSE 423 Fiber-Reinforced Composite Materials (4) Introduction to composites in polymer, metal, or ceramic matrices. Properties of individual phases and of fiber/matrix interface; micromechanisms of load transfer from matrix to fiber; fabrication and elastic and failure properties. Laboratory studies of processing and properties of composites. Prerequisite: ENGR 170, 210, and 220 or permission of instructor. Offered: W.

MSE 433 Polymeric Materials (3) Offered: A.

MSE 442 Seminar in Ethics and Safety (1) Deals with issues of engineering ethics and industrial safety within the context of materials science and engineering. Credit/no credit only. Prerequisite: senior standing. Offered: W.

MSE 455 Characterization Methods in Materials Science (4) Principles and applications of analytical techniques for materials characterization: X-ray, neutron, and electron diffraction; scanning and transmission electron microscopy; Auger electron spectroscopy. Prerequisite: 314.

MSE 456 Experimental Techniques in Materials Science (3) Analysis of measurement uncertainty and error; data analysis and plotting; vacuum technology; production and measurement of high temperatures; experiment and apparatus design; selected other measurement technique topics.

MSE 466 Physical Properties of Materials (4) Introduction to elementary solid-state concepts in materials. Atom bonding, statistical mechanics, free electron and band theories, thermal properties. Application of principles to conduction in metals, insulators, semiconductors, and to magnetic and optical processes in solids. Offered: W.

MSE 467 Electronic Materials Processing (3) Materials and processes used in the manufacture of electronic components. Basic principles of crystal growth, deposition, doping, diffusion, component delineation, and packaging as they apply to hybrid and integrated circuits and devices. Offered: Sp.

MSE 488 Special Topics (1-5, max. 8) Special topics in materials science and engineering offered as a course with lectures, conferences, or laboratory. Prerequisite: senior standing or above and permission of faculty member. Offered: AWSpS.

MSE 499 Special Project (-, max. 5) Materials science and engineering field or laboratory investigations in group or individual setting. Prerequisite: 399. Offered: AWSpS.

Metallurgical Engineering

MET E 421 Metallurgical Processing (4) Principles and applications of techniques used to process metals and alloys including solidification and casting, heat treating, forming, joining and machining and their effects on microstructure and properties. Prerequisite: ENGR 170. Offered: A.

MET E 432 Corrosion of Engineering Materials (3) Applications of physical chemical principles to the reaction of materials with their environments. Prevention and control of corrosion and oxidation processes. Corrosion problems in materials applications. Offered: W.

MET E 435 Corrosion (1) Laboratory experiences in application of physical chemical principles to reaction of materials with their environments. To accompany 432. Offered: W.

MET E 461 Engineering Physical Metallurgy (4) Phase transformations and strengthening mechanisms in ferrous and nonferrous alloys; heat treatment and microstructure control; physical metallurgy of carbon and alloy steels, aluminum and titanium alloys; microstructure-property relationships and alloy design. Offered: A.

MET E 462 Mechanical Behavior of Metals (3) Theories of elastic and plastic deformation in materials. Application of these theories in design, stress and strain, tensile and compression loading, yielding and plastic deformation, fracture, introduction to fracture mechanics, creep and fatigue. Offered: W.

MET E 463 Reliability and Design in Metallurgical Systems (4) Metallurgical design problems and failure analysis. Properties of commercially important engineering alloys. Prerequisite: MSE 316 or equivalent. Offered: Sp.

MET E 464 Extractive Process Analysis (3) Extractive processes analyzed by the methods of material and energy balances, computational thermodynamics, process kinetics and reactor theory. Introduction to process optimization. Prerequisite: MSE 322 or equivalent. Offered: Sp.

MET E 465 Mechanical Behavior Laboratory (1) Laboratory experience in mechanical behavior of metals. To accompany 462. Offered: W.

Courses for Graduates Only

Materials Science and Engineering

MSE 501 Ceramic Processing (3) Technology of ceramic fabrication processes. Characterization of ceramic materials at stages of processing.

MSE 510 Bonding, Symmetry, and Crystallography (4) Atomic bonding, coordination; structures, stability of organic and inorganic compounds in the solid-state. Reciprocal lattice concept, its vectorial basis. Crystallography of solids, emphasis on point and space group symmetries. Structures of complex organic, inorganic compounds. Introduction to physical properties described by tensors: elasticity, optical magnetic, electrical, thermal properties. Offered: A.

MSE 511 Advanced Theory of X-ray Diffraction (3) Use of the reciprocal lattice concept and Fourier analysis in the study of atomic arrangements in crystals. Line shape and diffuse scattering analysis. Analytical interpretation of diffraction patterns. Prerequisite: MSE 314 or equivalent.

MSE 512 Experimental Transmission Electron Microscopy (3) Fundamentals of electron optics as applied to microscopy; applications of contrast theories and electron diffraction with emphasis on defects and multiphase structures in crystalline solids. Prerequisite: 510. Offered: W.

MSE 513 Transmission Electron Microscopy Laboratory (2) One four-hour laboratory and one two-hour discussion/demonstration per week; metallic, ceramic, electronic biological sample preparation techniques; diffraction, imaging, and spectroscopy techniques in electron microscopy. Prerequisite: 512 which may be taken concurrently. Offered: W.

MSE 515 Advanced Transmission Electron Microscopy (3) Principles of image formation in crystalline and amorphous materials at the atomic resolution level; high spatial resolution electron diffraction with emphasis on convergent beam electron diffraction; quantitative elemental compositional and chemical analysis with energy dispersive x-ray spectroscopy and electron energy loss spectroscopy; high voltage electron microscopy. Prerequisite: 512 and 513. Offered: even years; Sp.

MSE 518 Advanced Mineralogy (3) Crystal symmetry: point groups, space groups. Mathematical description of crystal structures; group theory and irreducible representations; tensor description of physical properties; stress, strain, piezoelectricity, elasticity; structural and magnetic phase transition, Landau theory, deformation and creep in crystals; elasto-viscous properties of Earth's mantle, crystal chemistry and solid state reactions. Offered: even years; Sp.

MSE 520 Seminar (1, max. 6) Review of research problems in recent literature. Registration required for all graduate students. Credit/no credit only. Offered: AWSp.

MSE 521 Mechanical Behavior of Ceramics (3) Dislocation structures in ceramics; influence of dislocations on the deformation and fracture of single crystals and polycrystalline ceramics; brittle fracture and theoretical strength. Prerequisite: 511 or permission of instructor. Offered: Sp.

MSE 523 Advanced Extractive Metallurgy (3) Physical chemistry of solutions, mattes, fused salts, and slags. Discussion of papers from current literature. Prerequisite: basic course in thermodynamics or physical chemistry or permission of instructor. Offered: W.

MSE 524 Applied Rate Phenomena (3) Introduction to rate theory and transport processes. The principal thrust is on applications in ceramics and metallurgy. Prerequisite: basic course in transport phenomena or permission of instructor. Offered: W.

MSE 525 Thermodynamic Topics in Materials Science (3) Selected topics in application of classical and statistical thermodynamics to systems of current interest. Offered: Sp.

MSE 526 Dynamic Behavior of Metallurgical Systems (3) Interpretation of the behavior of systems by application of the methods of process analysis and control theory; modeling of systems, exploration of their characteristics by stimulus-response, and review of current industrial control processes. Prerequisite: graduate standing in engineering or permission of instructor. Offered: Sp.

MSE 541 Theoretical Structural Metallurgy (3) Detailed study of the general properties and effects of point, line, and surface defects in crystalline solids. Prerequisite: MET E 462.

MSE 551 Diffusion in Solids (3) Theories and principles of diffusion in solids; phenomenological and atomistic concepts; equilibrium defects; impurity, chemical potential gradient, grain boundary and dislocation effects in metals and nonmetals.

MSE 553 Vacuum Science and Technology (3) Fundamental theory and gas kinetics and treatment of gas flow, working principles of vacuum pumps and gauges, characteristics required of the vacuum components, material selection, fundamentals essential to vacuum system design. Covers both fundamental and practical aspects of modern vacuum science and technology.

MSE 555 Biomimetics: Bioinspired Design and Processing of Materials (4) How biological organisms produce materials with controlled structure, chemistry and hierarchy to attain physical properties far superior to traditional engineering materials. Fundamental biological building materials, their synthesis, and their self-assembly with emphasis on examples of soft and hard tissues.

MSE 559 Thin Film Science, Engineering, and Technology (3) The physics, chemistry, and engineering aspects of thin film deposition and technology. Vapor phase deposition emphasized. Topics include reactor types, vapor phase transport and hydrodynamics, surface and mass transport limited kinetics, nucleation and growth, homoepitaxy, heteroepitaxy, and thin film characterization. Prerequisite: permission of instructor. Offered: jointly with CHEM E 559.

MSE 561 Phase Transformations in Material Systems (3) Thermodynamics and kinetics of solid state reactions; phase stability, transition phases, theories of nucleation and spinodal decomposition, growth models, phase morphology and microstructure development, precipitation from solid solutions, examples of specific transformation types. Offered: Sp.

MSE 562 High Temperature Composites (3) Thermo-mechanical behavior and environmental degradation of high temperature composites (metal, ceramic, and intermetallic matrix composites) and carbon/carbon composites addressed. Covers related topics such as processing (primary and secondary). Recommended: 423 or ME 450. Offered: jointly with ME 562; odd years.

MSE 565 Electron Theory of Materials (3) Solid-state concepts of materials. Atomic bonding, statistical mechanics, Brillouin zone theory. Applications to conduction, optical, and magnetic properties of metals, semiconductors, and insulators. Prerequisite: 466. Offered: A.

MSE 566 Superconductors and Magnetic Materials (3) Theories of magnetic phenomena: dia-, para-, ferri-, and ferromagnetism; theories of superconductivity. Applicants in current technology superconductor materials and magnetic devices. Prerequisite: 466 or equivalent.

MSE 567 Electronic Materials: Preparation and Properties (3) Physics and technology of semicon-

ductor materials growth. Physics of growth, quantum wells, superlattices, strained layers. High vacuum technology and III-V characterization techniques. Limited enrollment. Prerequisite: permission of instructor.

MSE 571 Polymeric Materials (3) Relationships between configuration, conformation, molecular order, microstructure, properties of polymeric materials. Concepts relevant to tailoring polymer molecules and microstructures for specific applications. Interactions between polymers and their in-service environment. Characterization and processing techniques relevant to polymeric materials. Prerequisite: one semester or two quarters of organic chemistry. Offered: jointly with BIOEN 571; A.

MSE 572 Liquid Crystals (3) Properties of the liquid crystalline state are discussed in fundamental chemical and physical terms. Engineering and biological uses of liquid crystals are described in detail. Appropriate microstructural and nanostructural characterization techniques are emphasized throughout. Prerequisite: Molecular Bioengineering Fundamentals. Offered: jointly with BIOEN 572; Sp.

MSE 599 Special Topics In Materials Science (1-5, max. 5) Studies of special advanced topics in materials science. Prerequisite: permission of instructor. Offered: AWSpS.

MSE 600 Independent Study or Research (*) Offered: AWSpS.

MSE 700 Master's Thesis (*) Offered: AWSpS.

MSE 800 Doctoral Dissertation (*) Offered: AWSpS.

Mechanical Engineering

143 Mechanical Engineering

The Department of Mechanical Engineering focuses on increased productivity through modern design methods, automated manufacturing, and introduction of new materials. It also continues its strong history of involvement with conversion and management of energy. The department offers instruction and research in three principal areas: materials and manufacturing, systems and design, and energy and fluids.

The department offers undergraduate and graduate degree programs, with courses in design, analysis, and fabrication of mechanical devices; analysis of vibration and failure; automated manufacturing; combustion and energy systems; fluid mechanics; computer-aided design; robotics; and applications of mechanical engineering to interdisciplinary fields.

Undergraduate Program

Bachelor of Science in Mechanical Engineering

The general goal of the undergraduate program is to provide high quality, baccalaureate level preparation for professional practice by graduating students with the knowledge of the basic disciplines in mechanical engineering and with proficiency to solve and to communicate their solutions of open ended problems.

A student's success in achieving this goal is measured by success in specific technical courses (both required and optional) and particularly in the capstone design courses (ME 395 and 495). These capstone courses especially provide an assessment of the student's ability to integrate basic technical knowledge to achieve analysis and design goals in solving a wide range of open ended problems and communicating the results effectively.

The undergraduate program in mechanical engineering provides the sound educational basis in the mathematical, chemical, and physical sciences, and in computational, graphical, and written communication skills that is needed for professional work in the field.

Prospective students should obtain a copy of the *Mechanical Engineering Admission Guide* that contains more details regarding admission, and the *Mechanical Engineering Undergraduate Advising Guide* that contains a curriculum flow chart and information on scholarships, scheduling, and the continuation policy.

At the present time the undergraduate curriculum is being revised. Changes in the curriculum, admission policy, and graduation requirements are expected. Students should maintain close contact with the undergraduate advising office to be informed of changes as they are implemented.

Admission Requirements: Entrance to the department is by application and is competitive. Both early admission and upper-division admission are offered. Entrance requirement details, application deadlines, application forms, and advising literature may be obtained from the departmental office.

(1) Early Admission Group (EAG): Open to students enrolled at the UW who, prior to admission, have completed 15 credits of mathematics at the level of MATH 124, 125, 126; 10 credits of physical science courses (which includes the accompanying laboratories), at the level of PHYS 121/131, 122/132 or CHEM 140, 141, 150, 151 or above; and 5 credits of English composition. At least 15 of the credits must have been taken at the UW. Admission is for autumn quarter only and ENGR 231 must be taken no later than the academic year of admission.

(2) Upper-Division Admission Group (UAG): Students must have completed the following 62 credits: MATH 124, 125, 126, 307; PHYS 121/131, 122/132; CHEM 140, 141, 150, 151; ENGR 142, 210, 220, 230; ENGR 231; and 5 credits of English composition.

Both Early Admission and Upper-Division Admission require grades of at least 2.0 in each of the required classes together with an overall GPA of 2.50 or higher.

Graduation Requirements: The student must satisfactorily complete a minimum of 180 credits, with 100 credits in General Education and Engineering Fundamentals, as well as 62 credits of department-required courses and 18 credits of mechanical engineering option courses (400-level). A cumulative GPA of 2.00 or better, including a minimum GPA of 2.00 in all professional courses, is required.

Typical department-required courses include machine design analysis, behavior of engineering materials, manufacturing processes, mechanics of solids, system dynamics, thermodynamics, heat transfer, fluid mechanics, and mechanical engineering design.

Correspondence and Information

All inquiries concerning the mechanical engineering program should be addressed to the Department of Mechanical Engineering, Undergraduate Advising Office, 143 MEB, Box 352600. If possible, prior to applying for admission, prospective students are urged to make an appointment in the office by calling (206) 685-0908.

Graduate Program

The Department of Mechanical Engineering offers graduate programs leading to the degrees of Master of Science in Mechanical Engineering and Doctor of Philosophy. The department also provides an authorized option leading to the College-wide Master of Science in Engineering degree. These provide a balanced combination of formal instruction and independent research or design experience. Individual projects may be drawn from a wide spectrum of topics, which include

mechanical and energy conservation systems, heat transfer, combustion, fluid mechanics, applied mechanics, computational mechanics, computer-aided design and manufacturing, production systems, materials behavior, robotics, and applications of mechanical engineering science to a variety of such interdisciplinary fields as bioengineering, ocean engineering, and acoustics. Flexible requirements for course work provide opportunities both for a broad scientific and professional background and for specialty training.

Research Facilities

The department has well-equipped laboratories for pursuing research in various disciplinary fields in mechanical engineering and for constructing specialized research equipment. These include experimental stress analysis; materials testing; synthesis and simulation of electromechanical control systems; foundry, welding, and other metal fabrication operations; computer facilities for CAD/CAM research; wind tunnels for boundary-layer and high-speed flow analysis; combustion systems performance, exhaust emissions control, and combustion engines; acoustics, vibration, and dynamic testing and measurements and modal analysis; radiation, conduction, and convection (including multiphase) heat transfer analysis, and a bioengineering flow facility.

Financial Aid

Financial aid is offered to full-time graduate students so far as funds permit. This aid may be in the form of a research assistantship for sponsored programs, a fellowship provided by the University or industry, or a teaching assistantship.

Correspondence and Information

Graduate Program Coordinator
143 Mechanical Engineering, Box 352600

Faculty

Chair

Ashley F. Emery

Professors

Alexander, Daniel 1960, (Emeritus); MS, 1954, University of Washington; PhD, 1977, Washington State University; engineering design.

Balise, Peter * 1950, (Emeritus); MS, 1950, Massachusetts Institute of Technology; systems analysis and control.

Chalupnik, James * 1964, (Emeritus); PhD, 1964, University of Texas (Austin); sound and vibration, wave propagation.

Corlett, Richard * 1964; PhD, 1963, Harvard University; energy systems and combustion.

Daly, Colin H. * 1967; PhD, 1966, University of Strathclyde (UK); bioengineering, materials.

Day, Emmett E. * 1947, (Emeritus); PhD, 1962, University of California (Berkeley); materials, experimental stress analysis.

Depew, Creighton A. * 1960, (Emeritus); PhD, 1960, University of California (Berkeley); heat transfer, fluid mechanics.

Emery, Ashley F. * 1961; MS, 1958, PhD, 1961, University of California (Berkeley); bioengineering, energy conservation in buildings and air conditioning.

Freij, Joseph C. 1983, (Emeritus); MSME, 1941, University of Wisconsin; combustion, lubrication.

Fridley, James * 1988, (Adjunct); PhD, 1984, University of Washington; forest engineering systems design, interactive computer simulation.

Galle, Kurt R. * 1960, (Emeritus); PhD, 1951, Purdue University; instrumentation, controls, bioengineering.

Garbini, Joseph * 1979; PhD, 1977, University of Washington; systems and controls analysis, instrumentation, manufacturing automation.

Gessner, Frederick B. * 1967; PhD, 1964, Purdue University; fluid mechanics, turbulence.

Hyman, Barry * 1975; PhD, 1965, Virginia Polytechnic Institute & State University; energy policy, technology and public policy, quantitative methods.

Jorgensen, Jens E. * 1968; DSc, 1969, Massachusetts Institute of Technology; systems analysis, manufacturing, automation and controls, forest engineering.

Kapur, Kailash C. * 1992, (Adjunct); PhD, 1969, University of California (Berkeley); quality/reliability engineering, system design/optimization, total quality/reliability management.

Kippenhan, Charles J. * 1963, (Emeritus); PhD, 1948, University of Iowa; heat transfer, energy management.

Kobayashi, Albert S. * 1958; PhD, 1958, Illinois Institute of Technology; fracture mechanics, experimental and structural mechanics.

Kosály, George * 1980; PhD, 1974, Eotvos Lorand University (Hungary); DSc, 1979, Hungarian Academy of Sciences; applications of stochastic processes in engineering, reacting turbulent flows.

Love, William J. * 1970, (Emeritus); PhD, 1952, University of Illinois; design, mechanics, power systems.

Malte, Philip C. * 1979; PhD, 1971, University of Michigan; combustion, thermodynamics, fluid mechanics.

McCormick, Norman J. * 1966; PhD, 1965, University of Michigan; thermal and optical radiative transfer, optical oceanography, reliability and risk analysis.

McFeron, Dean E. * 1958, (Emeritus); PhD, 1956, University of Illinois; heat transfer and thermal power processes.

Morrison, James B. * 1946, (Emeritus); MS, 1954, University of Washington; design, dynamics.

Murphy, Stanley R. 1952, (Emeritus); PhD, 1959, University of Washington.

Pratt, David T. * 1981; PhD, 1968, University of California (Berkeley); turbulent combustion, computer simulation.

Ramulu, M. * 1978; PhD, 1982, University of Washington; manufacturing processes, production engineering, applied mechanics, fatigue and fracture mechanics.

Riley, James J. * 1983; PhD, 1971, Johns Hopkins University; fluid mechanics, especially turbulent flows.

Taggart, Raymond * 1959, (Emeritus); PhD, 1956, Queen's University (UK); mechanical metallurgy.

Taya, Minoru * 1986; PhD, 1977, Northwestern University; composite materials, elasticity and plasticity, impact physics, fracture theory.

Tuttle, Mark E. * 1985; PhD, 1984, Virginia Polytechnic Institute & State University; experimental stress analysis, composite materials, adhesion mechanics.

Vesper, Karl H. * 1969; PhD, 1969, Stanford University; business policy, mechanical engineering, marine studies.

Wolack, Jan * 1965, (Emeritus); PhD, 1965, University of California (Berkeley); mechanics of materials, manufacturing processes.

Woo, Tony C. 1995, (Adjunct); MSEE, 1974, PhD, 1975, University of Illinois; manufacturing systems, computer graphics and computational geometry.

Associate Professors

Adee, Bruce H. * 1970; MS, 1968, PhD, 1972, University of California (Berkeley); vessel safety and stability, floating structures, waves, ship resistance, model testing.

Berg, Martin C. * 1986; PhD, 1986, Stanford University; digital control system design, control of structurally flexible electromechanical systems.

Bodoia, John R. * 1964, (Emeritus); PhD, 1959, Carnegie-Mellon University; fluid mechanics, heat transfer, solar energy.

Calkins, Dale * 1979; DEng, 1976, University of California (Berkeley); transportation system design, computer-aided design and engineering.

Chalk, William 1957, (Emeritus); MSME, 1961, University of Washington; design graphics.

Ford, Paul W. * 1957, (Emeritus); MEng, 1959, University of Washington; manufacturing processes, metal casting.

Forster, Fred * 1977; PhD, 1972, Stanford University; fluid mechanics, acoustics, biomedical applications, micro-fluidics.

Ganter, Mark * 1986; PhD, 1985, University of Wisconsin; solid modeling, computer graphics, kinematics and automated manufacturing.

Holt, Richard * 1947, (Emeritus); MSME, 1957, University of Washington; manufacturing processes, welding.

Kieling, William C. * 1956, (Emeritus); MSME, 1959, University of Washington; design, dynamics, and kinematics.

Kramlich, John C. * 1991; PhD, 1980, Washington State University; heterogeneous combustion, pollutant formation and control from thermal systems, waste remediation.

Kumar, Vipin * 1988; PhD, 1988, Massachusetts Institute of Technology; manufacturing, polymer processing, microcellular plastics, design theory and methodology.

Messer, Rowland E. 1946, (Emeritus); MSME, 1935, University of Washington; graphics.

Reinhall, Per G. * 1982; PhD, 1982, California Institute of Technology; nonlinear dynamics, vibrations.

Sandwith, Colin J. * 1966, (Research); PhD, 1966, Oregon State University; corrosion, material science, design, manufacturing.

Sherrer, Robert E. * 1960, (Emeritus); PhD, 1958, University of Wisconsin; solid mechanics.

Sidles, John Arthur 1984, (Adjunct); PhD, 1983, University of Washington.

Storti, Duane W. * 1983; PhD, 1983, Cornell University; nonlinear dynamics and vibrations, dynamical systems, perturbations and bifurcations.

Tencer, Allan Fred * 1988, (Adjunct); PhD, 1981, McGill University (Canada).

Zabinsky, Zelda * 1985, (Adjunct); PhD, 1985, University of Michigan; operations research, applications in industrial engineering, optimization with stochastic elements.

Assistant Professors

Fabien, Brian C. * 1993; PhD, 1990, Columbia University; kinematics, modeling and simulation of physical systems, optimal control.

Helm, Joseph A. * 1993, (Adjunct); PhD, 1990, Purdue University; computer simulations, manufacturing systems and manufacturing engineering.

Jenkins, Michael G. * 1992; PhD, 1987, University of Washington; mechanical properties, performance and test methods of ceramics and ceramic composites.

Murray, William R. * 1989; PhD, 1988, Massachusetts Institute of Technology; modeling and control applied to automated manufacturing; robotics and instrumentation.

Sanders, Joan Elizabeth * 1993, (Adjunct); PhD, 1991, University of Washington; soft tissue biomechanics and tissue adaptation to mechanical stress.

Shen, I-Yeu (Steve) * 1993; PhD, 1991, University of California (Berkeley); linear and nonlinear vibrations, disk and machine dynamics, damping and vibration control.

Smith, Robert P. 1993, (Adjunct); PhD, 1992, Massachusetts Institute of Technology; design methodology, manufacturing systems, concurrent engineering.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

M E 295 Product Dissection (3) *Kumar, Jorgensen* Examination of the way products and machines work, their physical operation, the manner in which they are constructed, and the interaction between design, materials, and manufacture. Laboratories involve dissection and assembly of several common industrial and consumer products by student teams. Offered: jointly with IND E 295; Sp.

M E 304 Manufacturing Processes (3) *Ramulu* Study of manufacturing processes, including interrelationships between the properties of the material, the manufacturing process, and the design of component parts. Prerequisite: 354. Offered: AWSpS.

M E 323 Thermodynamics (4) *Kramlich* Applications of thermodynamic principles: properties of pure substances from an advanced point of view, nonreactive gas mixtures, energy analysis of reactive mixtures, chemical equilibria, combustion, power, and refrigeration cycle analysis. Prerequisite: ENGR 260. Offered: AWSp.

M E 331 Introduction to Heat Transfer (4) *Kramlich* Study of heat transfer by conduction, radiation, and convection; elementary heat-exchanger design. Prerequisites: ENGR 260, and 333 or CIVE 342. Offered: AWSp.

M E 333 Introduction to Fluid Mechanics (4) *Gessner* Introduction to the basic fluid laws and their application. Conservation equations, dynamic similarity, potential flow, boundary-layer concepts, effects of friction, compressible flow, fluid machinery, measurement techniques. Prerequisites: ENGR 260, and MATH 307. Offered: AWSpS.

M E 352 Mechanics of Solids (3) *Kumar* Development of relationships among loads, stresses, and deformations in the elastic behavior of machine or structural elements in tension, compression, bending, or torsion. Prerequisite: ENGR 220. Offered: AWSp.

M E 354 Mechanics of Materials Laboratory (3) *Jenkins* Study of the properties and behavior of engineering materials, including stress-strain relations, strength, deformation, fracture, creep, and cyclic fatigue. Introduction to experimental techniques common to structural engineering, interpretation of experimental data, comparison of measurements to numerical and analytical predictions, and formal engineering report writing. Prerequisites: 352, ENGR 170, and ENGR 220.

M E 356 Machine Design Analysis (4) *Kumar* Analysis, design, and selection of mechanical subsystems and elements, such as gears, linkages, cams, and bearings. Lecture and laboratory. Prerequisites: 352-354. Offered: AWSpS.

M E 373 Introduction to System Dynamics (5) *Jorgensen* Mathematical modeling, analysis, and design of physical dynamic systems involving energy storage and transfer by lumped-parameter linear elements. Time-domain response by analytical methods and numeric simulation. Laboratory experiments. Prerequisites: MATH 307 and 308 and ENGR 215 and 230. Offered: AW.

M E 374 Systems Dynamic Analysis and Design (5) *Jorgensen* Extension of 373. Frequency response analysis, generalized impedance concepts and applications, Fourier series analysis and Laplace transform techniques. Modeling and analysis of electromechanical actuators and rotating machinery. Laboratory experiments and design projects. Prerequisite: 373. Offered: WSp.

M E 392 Concurrent Engineering (3) *Smith* Focus on the need for and the tools of concurrent engineering in all engineering disciplines. Functional and cross-function organizations, new product development, market-need identification and design for manufacturing are explored. Prerequisite: 295, 304 CERE 401, CHEM E 485, CIVE 306, E E 331, IND E 295, or MET E 421. Offered: jointly with IND E 392.

M E 395 Introduction to Mechanical Design (4) *Calkins* Design process and methodology; decision making; optimization techniques; project planning; engineering economics; probabilistic and statistical aspects of mechanical design; ethical and legal issues. Lecture and laboratory. Prerequisites: 352, 373, ENGR 123, 260, ENGR 315. Offered: AWSpS.

M E 403 Material-Removal Processes (3) *Ramulu* Cutting and noncutting processes for material removal in the shaping of manufactured products. Study of forces and of power consumption and relative costs in the various processes. Prerequisites: 304 and 354, or permission of instructor. Offered: A.

M E 406 Corrosion and Surface Treatment of Materials (3) *Sandwich* Corrosion fundamentals and forms (galvanic, crevice, pitting, stress corrosion, erosion, hydrogen and leaching). Principles of design, materials selection, cathodic protection and surface treatments (coatings, carburizing, nitriding and plating) applied to reduce corrosion. Failure analysis applied to case studies. Offered: W.

M E 409 Introduction to Numerical Control and Computer-Aided Manufacturing (3) *Ramulu* Control system fundamentals, numerical control (NC) machine control systems, and the design aspect of NC machine tools, programming methods of NC machines, computer-aided manufacturing, CNC, DNC, and process optimization. Prerequisites: 304, 374, or permission of instructor. Offered: Sp.

M E 424 Combustion Systems (4) *Malte, Pratt* Flame and combustion theory, including chemical kinetics, mixing/diffusion, and heat transfer. Flame types. Combustion chamber theory, design concepts, and performance. Pollutant control by combustion modification and flame additives. Lectures and laboratory demonstrations. Prerequisite: 323 or permission of instructor. Offered: even years; Sp.

M E 425 Air Conditioning (4) Air conditioning, heating, and ventilating of buildings. Comfort and health, psychometric processes, load calculations, fluid distribution systems, simultaneous heat and mass transfer devices, controls. Design calculations involving these criteria, devices and systems. Prerequisites: 323, 331. Offered: Sp.

M E 426 Solar Energy Engineering (4) Fundamental principles of heat transfer, thermodynamics, and fluid mechanics are directed toward the analysis of devices for the collection and storage of solar energy, and of the syntheses of such devices into energy-delivery systems. Prerequisite: 331 or permission of instructor. Offered: odd years; Sp.

M E 428 Noise Control (3) Introduction to design for noise control. Includes summary of acoustical phenomena as they pertain to noise control and measurement. Noise rating schemes, particularly in relation to machine noise in the work environment. Prerequisite: junior standing in engineering. Offered: W.

M E 430 Advanced Energy Conversion Systems (4) Review of power cycles. Steam and gas, generation of thermal power, combustion and fuels, steam

power plant design considerations, gas turbine power plant operation and design, cogeneration, nuclear power, environmental considerations in power production. Otto, diesel, Stirling cycle analysis. Alternate energy sources. Offered: W.

M E 431 Advanced Fluid Mechanics (4) *Forster, Riley* Advanced topics in fluid mechanics, including kinematics, potential theory and vortex dynamics, viscous flow, turbulence, experimental and numerical methods, and design. Prerequisite: 333. Offered: A.

M E 432 Gas Dynamics (3) *Gessner* Dynamic and thermodynamic relationships for the flow of a gas. Application of thermodynamic processes involving nozzles, diffusers, compressors, and turbines. Prerequisites: ENGR 260 and 333 or CIVE 342. Offered: Sp.

M E 433 Turbomachinery (4) *Pratt* Thermodynamics, gas dynamics, and fluid mechanics of axial and centrifugal compressors, pumps, and turbines. Design and selection of components for engineering applications. Offered: W.

M E 434 Advanced Mechanical Engineering Laboratory (3) Introduction to engineering measurement problems and techniques including interpretation of experimental data based upon the theories of probability and statistics. Experiments in all areas of mechanical engineering using single-component and multicomponent systems. Prerequisites: 323, 331, 333, 354, 374, and ENGR 315. Offered: AWSpS.

M E 436 Friction and Wear of Materials (3) *Kumar* Study of principles of friction and wear behavior of materials and of those material properties that affect such behavior. Principles of lubrication. Applications to design of surfaces for wear resistance. Prerequisites: 333 and 356 or permission of instructor. Offered: Sp.

M E 450 Introduction to Composite Materials and Design (3) *Taya, Tuttle* Stress and strain analysis of continuous fiber composite materials. Orthotropic elasticity, lamination theory, failure criterion, and design philosophies, as applied to structural polymeric composites. Prerequisite: 352. Recommended: MSE 423. Offered: W.

M E 459 Introduction to Fracture Mechanics (3) Deformation processes leading to fracture, and the linear elastic fracture mechanics. Fatigue crack propagation. Fracture control and failure analysis. Prerequisite: 354 or permission of instructor. Offered: A.

M E 460 Kinematics and Linkage Design (3) *Ganter* Synthesis of linkage-type mechanisms using graphical and computer methods. Prerequisite: senior standing in engineering or permission of instructor. Offered: AW.

M E 468 Air-Pollution Control Equipment Design (3) *Pilat* Designs to control air pollutants from stationary sources. Procedures for calculating design and operating parameters. Fundamental mechanisms and processes of gaseous and particulate control equipment for absorption and adsorption of gaseous pollutants; electrostatic precipitation and filtration of particulate pollutants. Actual case studies. Prerequisite: senior standing or permission of instructor. Offered: jointly with CHEM E 468 and CIVE 494; W.

M E 469 Applications of Dynamics in Engineering (4) *Storti* Application of the principles of dynamics to selected engineering problems, such as suspension systems, gyroscopes, electromechanical devices. Includes Introduction to energy methods, Hamilton's principle and Lagrange equations and the design of dynamic system. Prerequisite: 374, ENGR 230 or permission of instructor. Offered: W.

M E 470 Mechanical Vibrations (3) *Reinhall* Single-degree-of-freedom linear systems techniques. Matrix techniques for multi-degree-of-freedom linear systems. Applications in vibration isolation, transmission, and absorption problems and instrumentation.

Prerequisite: 373 or permission of instructor. Offered: A.

M E 471 Automatic Control (4) *Berg, Garbini, Jorgensen* Dynamic system modeling; control system stability and performance analysis; compensator design by Bode and root-locus methods. Prerequisite: 374 or permission of instructor. Offered: ASP.

M E 473 Instrumentation (3) *Garbini* Principles and practice of industrial measurement. Dynamics of instrument response; theory of transducers for temperature, pressure, flow, and other measurements. Lecture and laboratory. Prerequisite: 374 or permission of instructor. Offered: A.

M E 474 Systems Modeling and Simulation (3) *Murray* Unified approach to modeling of systems, and computer simulation of systems behavior. Selecting system variables; writing state, loop, and node equations; modal response and state transition response; system functions and convolution; analogs. Applications to control, vibrations, and other problems. Prerequisite: 374. Offered: W.

M E 477 Embedded Computing in Mechanical Systems (4) *Garbini* Analysis of electromechanical systems employing microcomputers for control or data acquisition. Microcomputer architecture, memory organization, assembly language programming, interfaces, and communications. Particular emphasis on design of hardware and software interfaces for real-time interaction with mechanical systems. Weekly laboratory. Prerequisites: 373, 374, ENGR 215, or permission of instructor. Offered: W.

M E 478 Finite Element Analysis (4) *Reinhall* Development of theory and concepts of finite element analysis. Applications in all areas of mechanical engineering, including mechanics of solids, heat transfer, and design of dynamical systems. Weekly computer exercises. Prerequisites: 352, 374, MATH 308 or 302. Offered: ASP.

M E 480 Introduction to Computer-Aided Technology (4) *Calkins* Principles of computer-aided technology. Computer-aided design, engineering, drafting, and manufacturing; computer-aided design systems, geometry, computer graphics, hardware, computer-aided vehicle/system design synthesis. System demonstrations, laboratories, and site visits. Prerequisites: ENGR 123, 142. Offered: ASP.

M E 481 Internal Combustion Engines (5) *Malte* Spark ignition and diesel engines. Thermodynamic cycles, fuels, carburetion and injection, ignition, combustion, friction, turbocharging, and performance of engines. Lecture and laboratory. Prerequisite: 323 or permission of instructor. Offered: A.

M E 490 Naval Architecture (3) *Adee* Theory of naval architecture; ship's lines, hydrostatic curves, intact and damaged stability, launching. Prerequisite: junior standing in engineering or permission of instructor. Offered: A.

M E 491 Naval Architecture (3) *Adee* Theory of naval architecture; strength, ABS rules, water waves, ship and platform motions. Prerequisite: junior standing in engineering or permission of instructor. Offered: W.

M E 492 Naval Architecture (3) *Adee* Theory of naval architecture; dimensional analysis, resistance, model testing, propellers, steering. Prerequisite: junior standing in engineering or permission of instructor. Offered: Sp.

M E 495 Mechanical Engineering Design (4) *Hyman* Design laboratory involving the identification and synthesis of engineering factors to plan and achieve specific project goals. Current literature and prerequisite texts are used as reference sources. Lecture and laboratory. Prerequisites: 331, 356, 374, 395. Offered: AWSp.

M E 496 Technology-Based Entrepreneurship (3) *Heim* Concentrates on hands-on aspects of innovation and entrepreneurial enterprise development. Examines relationships between innovation, iterative prototyping, and marketing testing. Students identify market opportunities, create new technology-based products and services to satisfy customer needs, and construct and test prototypes. Prerequisites: ENGR 250 and one design course. Offered: jointly with IND E 496

M E 498 Special Topics in Mechanical Engineering (1-5, max. 6) Lecture and/or laboratory. Maximum of 6 credits may be applied toward an undergraduate degree. Prerequisite: permission of instructor.

M E 499 Special Projects (2-5, max. 9) Written report required. Prerequisite: permission of department Chairperson. Offered: AWSps.

Courses for Graduates Only

M E 510 Mathematical Foundations of Systems Theory (4) *Damborg* Mathematical foundations for system theory presented from an engineering viewpoint. Includes set theory; functions, inverse functions; metric spaces; finite dimensional linear spaces; linear operators on finite dimensional spaces; projections on Hilbert spaces. Applications to engineering systems stressed. Prerequisite: graduate standing or permission of instructor. Offered: jointly with A A 546/CHEM E/ E E 510; A.

M E 518-519-520 Seminar (0-0-1, max. 6) Credit/no credit only. Offered: A-W-Sp.

M E 521 Thermodynamics (3) *Emery, Malte, Pratt* Fundamental concepts of temperature, thermodynamic properties, and systems. The first, second, and combined laws. Development of the relations of classical thermodynamics. Introduction to statistical thermodynamics. Prerequisites: 323 and graduate standing in mechanical engineering or permission of instructor. Offered: odd years; A.

M E 522 Thermodynamics (3) *Emery, Malte* Topics from statistical thermodynamics, including the Boltzmann, Bose-Einstein, and Fermi-Dirac statistics. Solutions of the Schrodinger wave equation and evaluation of the partition function for translation, rotation, and vibration. Prerequisite: 521 or permission of instructor. Offered: by request only; even years; W.

M E 523 Combustion Seminar (1) *Kramlich, Malte, Pratt* Seminar on combustion and energy systems, including discussions on current topics in combustion science and technology, and presentations by experts in the field. Credit/no credit only.

M E 524 Combustion (3) *Malte, Pratt* Chemical and physical processes of combustion with applications to design of combustors, fuel selection, and consideration of environmental effects. Prerequisite: graduate standing in mechanical engineering or permission of instructor. Offered: odd years; Sp.

M E 525 Acoustics in Engineering I (3) *Forster* Acoustic wave transmission, reflection, refraction, and diffraction. Review of continuum mechanics and examples from electromechanical systems. Prerequisite: graduate standing in mechanical or electrical engineering, or permission of instructor. Offered: jointly with E E 525; W.

M E 526 Acoustics in Engineering II (3) *Forster* Continuation of 525. Material differs each year, covering such topics as scattering, moving media, ultrasonics, acoustic holography, optoacoustics, transducer design, propagation in anisotropic medium. Prerequisite: 525 or permission of instructor. Offered: jointly with E E 526; Sp.

M E 530 Radiative Heat Transfer (3) *Emery, Malte* Fundamentals of thermal radiation for black, gray, nongray, diffuse, and specular surfaces. Gaseous radiation and special applications of thermal radiation.

Prerequisite: graduate standing in mechanical engineering or permission of instructor. Offered: W.

M E 531 Conductive Heat Transfer (3) *Emery* Analysis of steady-state and transient heat conduction in single- and multidimensional systems by mathematical, graphical, numerical, and analogical methods. Prerequisite: graduate standing in mechanical engineering or permission of instructor. Offered: odd years; A.

M E 532 Convective Heat Transfer (3) *Emery* Introduction to fluid flow and boundary-layer theory as applicable to forced- and natural-convection heat transfer. Condensation and boiling heat transfer. Prerequisite: graduate standing or permission of instructor. Offered: Sp.

M E 533, 534 Fluid Mechanics (3,3) *Gessner, Kosáry, Riley* Basic conservation laws and kinematics of fluid flow, two-dimensional inviscid flow, wave motion and shock waves in inviscid compressible flow, exact solutions and boundary layer analyses of laminar and turbulent viscous flow, analysis of non-Newtonian flow, applications. Prerequisite: 533 or permission of instructor for 534. Offered: W, Sp.

M E 535 Computational Techniques in Heat Transfer (3) *Emery, Pratt* Advanced heat transfer studies of interest to mechanical engineers. Subject coverage varies from year to year. Prerequisite: permission of instructor. Offered: A.

M E 537 Topics in Fluid Mechanics (3) *Emery, Gessner, Pratt, Riley* Selected fluid mechanics research topics relevant to current advances in mechanical engineering practice. Topics selected vary with faculty and student interest, but are drawn predominantly from the general areas of energy conversion, energy management, and manufacturing processes. Offered: even years; A.

M E 538 Turbulent Boundary Layer Theory (3) *Gessner, Riley* Characteristic features of turbulent boundary layers; development of the turbulent boundary layer equations; equilibrium boundary layers; integral methods of solution based on power law and wall-wake velocity profiles; methods of solution based on higher order constitutive equations; application to diffuser flows and free shear flows; new developments and physical models. Offered: odd years; A.

M E 541 Fatigue of Materials (3) Macro and micro aspects of fatigue of metals and fatigue mechanisms. Analytical methods for fatigue and life assessment in advanced materials. Offered: W.

M E 543 Fluid Turbulence (3) *Gessner, Riley* Methods of characterizing fluid turbulence; probability concepts; spatial and temporal velocity correlations; spectral energy transfer; turbulent diffusion; isotropic turbulence and Kolmogoroff's hypothesis; Taylor's hypothesis; hot-wire measurement techniques. Prerequisite: 3 credits of graduate level fluid mechanics or permission of instructor. Offered: even years; W.

M E 544 Advanced Turbulence Modeling Techniques (3) *Gessner, Riley* The Reynolds stress transport equations; plane homogeneous shear flow; modeling the pressure-strain, diffusion, and dissipation rate correlation tensors; one and two-equation turbulence models; near-wall turbulence and wall functions; limitations of length scale and eddy viscosity modeling. Prerequisite: 3 credits of turbulence related course work. Offered: even years by request only; Sp.

M E 548 Linear Multivariable Control (3) *Ly, Vagners* Single loop feedback control theory; poles, zeros, Nyquist stability, performance, robustness of multivariable systems; multivariable control synthesis: Linear-Quadratic-Gaussian methods, loop transfer recovery, Youla parametrization, H-infinity techniques, parameter optimization design. Prerequisite: EE 584 or M E 575; E E 446 or A A 448 or M E 471 or equivalent. Offered: jointly with A/E E 548; W.

M E 549 Estimation and System Identification (3) *Vagners* Review of system models, model structure, model parametrization; review of stochastic processes; state estimation: observers, the Kalman-Bucy filter, numerical issues in filter design and implementation; system identification: linear regression, least squares, maximum likelihood, instrumental variable techniques. Prerequisites: E E 505 or AMATH 506 or STAT 506; recommended: 548 or E E 548. Offered: jointly with A/E E 549; Sp.

M E 550 Nonlinear Optimal Control (3) *Vagners* Calculus of variations for dynamical systems, definition of the dynamic optimization problem, constraints and Lagrange multipliers, the Pontryagin Maximum Principle, necessary conditions for optimality, the Hamilton-Jacobi-Bellman equation, singular arc problems, computational techniques for solution of the necessary conditions. Prerequisite: graduate standing; recommended: A A 548 or E E 548. Offered: jointly with A/E E 550; odd years.

M E 551 Elasticity I: Elastostatics (3) Elastostatics, including general formulations of 2D and 3D elastostatic problems (stress function method, complex variable method, displacement potential method). Eth Eshelby's method is emphasized and used to solve 2D and 3D problems with special application to composite materials. Offered: A.

M E 552 Elasticity II: Viscoelasticity and Elastodynamics (3) Elastodynamics includes wave propagation in linear elastic and linear viscoelastic solids where solids are monolithic materials, composite materials. Viscoelasticity part includes the stress-strain equations in terms of convolution integral, Fourier transform and Laplace transform modes. Simple and fundamental problems are solved by several techniques as demonstration.

M E 553 Adhesion Mechanics (3) *Tuttle* Introduction to adhesive systems and test/evaluation techniques. Stress/strain analysis methods used with adhesive joints. Examples of practical applications. Prerequisite: graduate student status or permission of instructor. Offered: even years; Sp.

M E 555 Thermoelasticity (3) *Emery* Basic equations of thermoelasticity for isotropic elastic solids. Analysis of disks, cylinders, spheres, beams, and plates under steady temperature and sudden and slow heating and cooling. Introduction to thermoelastic stability. Prerequisite: 551 or permission of instructor. Offered: by request only; even years; W.

M E 556 Experimental Stress Analysis I (3) *Tuttle* Theory and practice of experimental techniques including brittle coatings, strain gages, thermocouples, LVDT's, and transducer design. Lecture and laboratory. Prerequisite: graduate standing or permission of instructor. Offered: A.

M E 557 Experimental Stress Analysis II (3) *Tuttle* Theory and practice of optical mechanics, including 2- and 3-dimensional photoelasticity, birefringent coatings, moiré, interferometry, and holography. Lecture and laboratory. Prerequisite: graduate standing or permission of instructor. Offered: W.

M E 559 Fracture Mechanics I (3) *Kobayashi, Ramulu* Applications of linear fracture mechanics to failure analysis and fracture control based on actual case studies. Fracture toughness and fatigue testing techniques, crack initiation and propagation fatigue life prediction of mechanical components subjected to environmental effects. Offered: W.

M E 560 Fracture Mechanics II (3) *Kobayashi* Theories of linear fracture mechanics, fracture dynamics, ductile fracture, stable crack growth and mixed mode fracture. Discussion of advanced topics from recent literature. Prerequisite: 559 or permission of instructor. Offered: even years; Sp.

M E 562 High Temperature Composites (3) *Taya* Thermo-mechanical behavior and environmental deg-

radation of high temperature composites (metal, ceramic, and intermetallic matrix composites) and carbon/carbon composites addressed. Covers related topics such as processing (primary and secondary). Recommended: 450 or MSE 423. Offered: jointly with MSE 562; even years; Sp.

M E 564 Mechanical Engineering Analysis (3) *Storti* Application of mathematical methods to the description and analysis of systems in mechanical engineering. Analogies in heat transfer, fluid flow, stress distribution, dynamics, and feedback control. Prerequisite: graduate standing in mechanical engineering or permission of instructor. Offered: A.

M E 565 Mechanical Engineering Analysis (3) *Storti* Applications of vectors, matrices, and partial differential equations to mechanical engineering systems, including computational techniques and analogies. Prerequisite: graduate standing in mechanical engineering or permission of instructor. Offered: W.

M E 566 Introduction to Random Processes (3) *Kosdy, Reinhall* Probability and random variables. Ensemble averaging, probability density function, auto- and cross-correlation functions. Brownian motion, Poisson process. Ergodicity. Frequency domain analysis, auto- and cross-spectrum, transfer function. Fundamentals of digital spectral analysis. Applications in fluid mechanics, acoustics and vibrations. Offered: by request only; even years; A.

M E 571 Digital Control I (3) *Berg, Garbini, Murray* Discrete-time dynamic system analysis. Sampled data systems. Controller design via discrete-time equivalents to continuous-time transfer function; via root loci and Bode plots; and via state feedback and observers. Prerequisites: 575 or permission of instructor. Offered: W.

M E 572 Digital Control II (3) *Berg, Garbini, Murray* Quantization effects. Parameter identification. LQR optimal control. Discrete-time stochastic processes. The Kalman filter. LQG optimal control. Sample rate selection and antialiasing filter design. Advanced topics in MIMO controller design. Prerequisite: 571 or permission of instructor. Offered: Sp.

M E 575 Linear System Theory (3) *Berg* State-space representations. Solution of the state equation; state transition matrix. Controllability and observability. State feedback, observer design; the separation principle. Zeros and poles of multivariable systems; the Smith McMillan form. Systems invertibility. Prerequisite: graduate standing or permission of instructor. Offered: A.

M E 579 Fluid Power Systems (3) *Jorgensen* Design, analysis, and control of fluid power systems. Steady-state analysis of valves, actuators, and transmissions. Dynamic modeling, response, stability, and control analysis via linear element representation and computer simulation. Prerequisite: graduate standing in mechanical engineering or permission of instructor. Offered: W.

M E 583 Nonlinear Control Systems (4) *Hannaford, Nages* Assessment of stability by: Phase Plane and Describing Function Methods, Circle and Popov Criteria, Lyapunov Criteria and construction of Lyapunov Functions by method of Kraasovskii and Lu're. Feedback linearization: input-state and input-output linearization. Prerequisite: E E 446 or 584 or permission of instructor. Offered: jointly with E E 583; odd years; Sp.

M E 584 Combustion in Airbreathing Propulsion (3) Fundamentals of gasdynamics, mixing, and thermodynamics applies to the analysis and design of gas turbine, ramjet and scramjet engine combustors, with treatment of computer simulation. Offered: even years; A.

M E 588 Dynamics and Vibrations (3) *Reinhall, Storti* Variational techniques, Hamilton's principle,

Lagrange's equations applied to dynamics of particles and rigid bodies. Vibration analysis of multi-degrees-of-freedom and continuous systems. Prerequisite: graduate standing in engineering or permission of instructor. Offered: A.

M E 589, 590 Vibrations (3,3) *Reinhall, Storti* Study of systems with nonlinear damping and restoring forces excited by deterministic or random inputs. Applications in measurement, testing, and design of mechanical systems. Nonlinear systems are emphasized in 589 and random inputs in 590. Prerequisite: 588 or permission of instructor. Offered: even years; W, Sp.

M E 591 Robotics and Control Systems Colloquium (1, max. 3) Colloquium on current topics in robotics and control systems analysis and design. Topics presented by invited speakers as well as on-campus speakers. Emphasis on the cross-disciplinary nature of robotics and control systems. Offered: jointly with A A/CHEM E/E E 591; AWSp.

M E 598 Topics in Research (1) Doctoral seminar. Credit/no credit only. Offered: AWSp.

M E 599 Special Projects (1-5, max. 9) Written report required. Prerequisite: permission of department Chairperson. Offered: AWSp.

M E 600 Independent Study or Research (*) Written report required. Offered: AWSp.

M E 700 Master's Thesis (*) Offered: AWSp.

M E 800 Doctoral Dissertation (*) Offered: AWSp.

Mechanical Engineering Industrial Engineering

MEIE 516 Advanced Topics in Engineering Statistics (3) *Roberts, Zabinsky* Topics are flexible and tailored to the needs of the particular student group involved. Topics usually considered: regression, correlation, experimental design, Monte Carlo techniques, Markov processes, extreme value theory, time-series analysis. Prerequisite: graduate standing or permission of instructor.

MEIE 599 Special Projects in Industrial Engineering (1-5, max. 9) Prerequisite: permission of industrial engineering program director. Offered: AWSp.

Technical Communication

Technical communicators use their language, visual, and analytical skills, as well as training and research in electronic and other media, to create and enhance communication in scientific and technical environments. The Department of Technical Communication prepares students to design, create, edit, and evaluate technical and scientific materials. The department also provides course work in the development of on-line support systems and in electronic information presentations. Other major interests of the department are the human-computer interface, hypermedia, communications technology, the rhetoric of technical discourse, publications and communications management, policy analyses of technological systems, and research and testing.

Undergraduate Program

Bachelor of Science in Technical Communication

The Department of Technical Communication offers a Bachelor of Science in Technical Communication (B.S.T.C.).

Admission Requirements: The department classifies applicants by admission group; the specific requirements for each are described below.

(1) Early Admission Group (EAG): Open to students enrolled at the UW. Applicants must have completed 38 credits distributed as follows: 10 credits of approved mathematics or statistics; 15 credits of approved natural science; and 13 credits of approved written and oral communications (including ENGR 231). Admission is for autumn quarter only; the application deadline is given in the departmental brochure.

(2) Upper-Division Admission Group (UAG): Students must have completed 60 credits, 38 of which are distributed as above. Admission is for autumn or spring quarter; application deadlines are given in the departmental brochure.

Applicants must have a GPA of 3.00 in the written and oral communications courses and a 2.00 GPA overall.

Students applying for admission in their senior year will be expected to spend a minimum of four quarters in the degree program, which allows students time to grow, to develop the necessary skills, and to integrate the knowledge necessary to enter the profession.

Graduation Requirements: The B.S.T.C. degree requires 180 credits, distributed according to the following minimum number of credits in each component: 50 credits in mathematics and natural science (with a minimum of 15 credits in mathematics and/or statistics and 15 credits in natural science); 13 credits of written and oral communications (including ENGR 231); 12 credits of technical/analytical course work (including either CSE/ENGR 142 or PHIL 120); 35 credits of VLP and I&S (with one in-depth sequence); 35 credits of required T C courses; 24 credits of approved electives that demonstrate a coherent and relevant area of specialization; and 11 credits of free electives.

For more information, contact the Undergraduate Adviser, 14 Loew.

Graduate Programs

Master of Science

Technical communication offers a Master of Science (M.S.) in technical communication. A total of 45-48 credits is required for the M.S. degree, including 36 credits of course work and either (1) 9 credits of thesis, (2) a 9-credit combination of 5 credits of internship and 4 credits of report project, or (3) a 12-credit linked set of courses. The 36 credits of course work include 19 credits of required T C courses: 501 (3 credits), 502 (3), 505 (3), 510 (3), 520 (3), 521 (1), plus one of the following: T C 515 (3), 516 (3), or 517 (3); 11-15 credits of technical courses; and 3-7 credits of free electives.

In making recommendations for admission, the faculty consider an applicant's (1) undergraduate GPA; (2) undergraduate degree program and work experience; (3) the Graduate Record Examination (GRE) Verbal score; (4) the Test of English as a Foreign Language (TOEFL) score (if applicable); (5) letters of recommendation; and (6) Statement of Goals and Career Objectives. A limited number of prerequisite undergraduate courses may be required.

Research Facilities

Technical communication students enjoy access to a variety of computer systems and services. They have the opportunity to participate in the development of new information products, document formats, insights into human information processing, and publications practices and technologies. Technical communication also currently supports the following specialized laboratories: the Hypermedia Lab, Laboratory for Usability Testing and Evaluation (LUTE), and the Technical Japanese Lab.

For more information, contact the Graduate Adviser, 14 Loew.

Financial Aid

A limited number of teaching and research assistantships and scholarships are available for the financial support of graduate students in technical communication. More information and application forms can be obtained by contacting the department.

Correspondence and Information

Department of Technical Communication
14 Loew, Box 352195

Master of Science in Engineering- Technical Japanese Program

The Technical Japanese Program, within the College of Engineering Interengineering Program, is a two-year, 50-credit master's degree program which combines graduate work in a science or engineering field with advanced instruction in technical Japanese language. The degree equips students with the skills necessary to read technical literature in Japanese and to work effectively with Japanese engineers and scientists in research and business environments. The program includes a summer internship in Japan in an industrial or research setting.

Students are admitted to the program only for autumn quarter and the application deadline is February 15. To be admitted, applicants must have: a bachelor's degree in engineering or science; an undergraduate GPA of at least 3.00; two years of college-level Japanese or equivalent training; satisfactory scores on the GRE; and satisfactory scores on the Japanese Proficiency Test (administered by the Technical Japanese Program).

For more information, contact Miriam Rich, Program Coordinator, 13 Engineering Library, (206) 685-1109.

Faculty

Chair

Mark P. Haseikorn

Professors

Bereano, Philip L. * 1975; JD, 1965, Columbia University; MPP, 1971, Cornell University; technology assessment, social values, public policy technology: social values, citizen participation.

Butterfield, Earl C. * 1981, (Adjunct); PhD, 1963, George Peabody College; cognitive development, metacognition.

Haseikorn, Mark P. * 1985; PhD, 1977; University of Michigan; real-time information systems, human/machine interaction, the computer in technical communication.

Skeels, Dell R. 1949, (Emeritus); MA, 1942, University of Idaho; PhD, 1949, University of Washington; folklore, myth, and folktale.

White, Myron 1943, (Emeritus); PhD, 1958, University of Washington; technical editing and publications management.

Winn, William David * 1985, (Adjunct); PhD, 1972, Indiana University; educational technology, instructional theory, instructional design, visual information processing.

Associate Professors

Barfield, Woodrow * 1987, (Adjunct); PhD, 1986, Purdue University; interactive computer graphics, human factors in computer systems.

Coney, Mary B. * 1976; PhD, 1973, University of Washington; writing style and theories of technical communication, rhetoric.

Farkas, David K. * 1983; PhD, 1976, University of Minnesota; advisory interface of computer systems, interactive multimedia, information design.

Ramey, Judith A. * 1983; PhD, 1983, University of Texas (Austin); computer documentation, online documentation, user interface design and usability testing.

Spyridakis, Jan * 1978; PhD, 1986, University of Washington; comprehension and usability, research methods, document design.

Tsutsui, Michio * 1990; PhD, 1984, University of Illinois; technical Japanese, international technical communication, linguistics, computer-aided instruction.

Williams, Thomas R. * 1976; MC, 1981, PhD, 1988, University of Washington; text and visual information processing, document design, interactive multimedia.

Assistant Professors

Dailey, Daniel J. * 1982, (Adjunct Research); PhD, 1988, University of Washington; time series modeling of physical phenomena, optimization, distributed computing, networking.

Illman, Deborah L. 1982, (Research); PhD, 1981, Universidad Estadual de Campinas (Brazil); science/engineering news reporting, communication tools in science/engineering education.

Le Brasseur, Michele A. 1990, (Research); PhD, 1987, Indiana University; instructional design for digital media, project management.

Lecturers

Kato, Masashi 1988; MA, 1980, University of Washington; research methods, Japanese curriculum design, JSL, computer-assisted language learning.

Nakamura, Keiko 1995; MA, 1995, University of Illinois; Japanese language pedagogy; Japanese language linguistics.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

T C 300 Practice in Technical Reporting (1-2, max. 2) Application of the fundamentals of technical reporting to the specific reporting activity of students who are enrolled in a jointly designated engineering, scientific, or technical course. Offered: A.

T C 310 The Computer in Technical Communication (4) Functions of, and relationships among, computer applications, systems software, and computer hardware in technical publications and communication. Required of technical communication majors. Prerequisites: T C major or permission of instructor. Offered: A.

T C 400 Scientific and Technical Communication (3) Coney, Spyridakis Principles and practices of writing to communicate scientific and technical information to a variety of readers, including the expert, general scientific and technical reader, manager, and general public. Required of technical communication majors. Prerequisite: Junior standing or permission of instructor. Offered: ASP.

T C 401 Style in Scientific and Technical Writing (3) Coney, Spyridakis Grammatical structures and stylistic strategies within specific professional contexts. Achieving clarity and conciseness through word choice and placement, using a variety of sentence structures for appropriate emphasis, handling details, establishing effective tone. Required of technical communication majors. Prerequisite: junior standing or permission of instructor. Offered: ASP.

T C 402 Scientific and Technical Editing (3) Farkas, Williams Editorial responsibilities and practice in the communication of scientific and technical information; the editor's role both as editor and as supervisor of publication groups. Required of technical communication majors. Prerequisite: 401 or permission of instructor. Offered: W.

T C 403 Publication Project Management (3) Plumb Responsibilities and practice in managing publication projects in scientific and technical organizations. Project design, coordination, production, and evaluation, including planning, organizing, staffing, and directing. Required of technical communication majors. Prerequisite: T C major or permission of instructor; recommended: 415. Offered: Sp.

T C 406 Understanding Research in Technical Communication (3) Spyridakis Provides a basis for integrating knowledge acquired in other technical communication courses. Students examine the research literature of various disciplines that impact technical writing. Structured around theoretical and empirical literature as it relates to different textual issues in technical writing. Offered: W.

T C 407 Computer Documentation (3) Farkas, Ramey Writing documentation for computer hardware, software, and integrated systems. Examines kinds of documentation needed for computer products; introduces use of the computer in its own documentation and resulting innovations in the field. Prerequisites: 310 or equivalent, upper-division standing. Offered: Asp.

T C 408 Public Documents: Proposals, EIS's, Assessments (3) Bereano Analyzing special documents of public character: proposals, EISs, questionnaires, technology assessments. Understanding socio-political milieu in which they are planned, organized, written; the specialized audiences (e.g., agencies with their missions, guidelines, constituencies; citizen groups; commercial interests) they serve. Documents, the decision-making process. Prerequisite: upper-division standing or permission of instructor. Offered: odd years; Sp.

T C 409 Writing for Publication (3) Coney Writing for professional and trade periodicals in science, engineering, and technology; examination of the publication process, including the roles of author, editor, and reviewer; selecting the appropriate periodical; organizing and writing the article. Prerequisite: 400 and 401 or permission of instructor. Offered: W.

T C 411 Visual Media in Technical Communication (3) Williams Use of visuals in print and electronic communication of technical matter. Topics include the human visual system, theories of perception and attention, effects of visuals on learning from text, competing theories of memory for visuals, use of visuals in conjunction with prose, and the impact of new visual display media. Offered: A.

T C 415 Production Editing (5) Ramey, Williams The editorial role in the preparation of text and visual materials for production. The editor's responsibilities and prerogatives as they relate to those of other professionals in the production phase of the publications field. Prerequisite: T C major or permission of the instructor. Offered: W.

T C 420 Introduction to Technology as a Social and Political Phenomenon (3/5) Bereano Introductory survey presenting some of the issues pertaining to technology and social change, technology and values. Emphasis on the social, political, and economic aspects of current problems that have important technological components. Prior technical background not required; readings from diverse sources. Offered: A.

T C 425 Technology Assessment (3/5) I&S Bereano In-depth analysis of the concept, practice, and methods of technology assessment (policy analysis that concentrates on social consequences of tech-

nological development): social, political, economic, and environmental impacts of new technologies; options for channeling these developments; and relevant decision-making institutions and processes. Offered: W.

T C 438 Design and Authoring of CAI (3) *Winn* Introduction to the design of computer-assisted-instructional programs. Types of learning, characteristics of effective instruction. Students design and produce CAI programs using authoring systems for computers. Offered: jointly with EDC&I 436; A.

T C 454 Alternative Technology (3) *I&S Bereano* Exploration of the evolution of technological forms that are small-scaled, decentralized, emphasizing the public policy aspects of these developments. Topics include the relationship between alternative technologies and worker-controlled enterprises, community planning, the politics of technological change, the Third World, and decentralized development. Background in engineering or technical design is not required. Offered: A.

T C 455 User Interface Design (3) *Barfield* Design oriented to cover fundamentals of user interface design; models on human computer interaction, software psychology, input devices, usability, cognitive and perceptual aspects of human-computer interaction, advanced interfaces, and research methodologies are discussed. Prerequisites: ENGR 315 and 316 or equivalent, or permission of instructor. Offered: jointly with IND E 455; A.

T C 493 Senior Study (5) Integration of knowledge and skills acquired during major program into one paper or project. Prerequisite: senior standing and approval of proposal by faculty advisor. Offered: AWSpS.

T C 495 Professional Practice (3-5, max. 10) *Williams* Supervised internship in a publications organization approved by the faculty adviser. A minimum of one internship is required of students majoring in technical communication. Credit/no credit only. Prerequisites: T C major or permission of instructor. Offered: AWSpS.

T C 498 Special Topics (1-5, max. 10) Special topics in technical communication to be offered occasionally by permanent or visiting faculty members.

T C 499 Special Projects (2-5, max. 10) Individual undergraduate projects in technical communication. Prerequisite: permission of instructor. Offered: AWSpS.

Courses for Graduates Only

T C 501 Theoretical Dimensions of Technical Communication (3) *Coney* Theories and research drawn from a variety of fields that inform such topics as the historical and social context of technical communication, the aims of technical discourse, readability, invention and audience, audience analysis, technical style, and graphics. Prerequisite: admission to an engineering master's program or permission of instructor. Offered: A.

T C 502 Empirical Traditions in Technical Communication (3) *Williams* Introduction to the empirical traditions that inform research and practice in the field of technical communication. Topics include modes of empirical research, communications impli-

cations of differences between iconographic and orthographic media, and text and graphic factors affecting comprehension, retention, and performance. Prerequisite: T C graduate standing or permission of instructor. Offered: W.

T C 505 Computer-Assisted Communication (3) *Ramey* Introduction to the concepts of information theory; information management in the larger context of computerized publishing (both procedures and technologies internal to the publishing unit and electronic media for external dissemination of information). Prerequisite: T C graduate standing or permission of instructor. Offered: A.

T C 509 Writing the Scientific Article (3) *Coney, Ilman* Examination of principles and practice of writing research manuscripts, articles, abstracts, and oral presentations. Detailed examination of scientific publication process includes issues of style, organization, and ethics. Students draft, critique, and revise their own manuscripts and learn to review the manuscripts of others. Offered: Sp.

T C 510 Information Design (3) *Farkas* Examination of the design principles and procedures underlying the creation of both print and electronic information presentations. Topics include: print vs. electronic media, designing for the page and screen, information topologies, and hypermedia. Seminar includes a design project. Prerequisite: 501 or permission of instructor. Offered: Sp.

T C 515 Designing Natural Language Interfaces (3) *Haselkorn* Relationship between formal and natural languages. Application of this relationship to designing interface languages that allow users to access machine functionality using natural language. Prerequisite: upper-level course in logic, semantics, computer languages or permission of instructor.

T C 516 Research Methods in Technical Communication (3) *Spyridakis* Introduction to research methods in technical communication. Students examine the relationship between theory and research, hypothesis testing, experimental designs, modes of observation, sampling, validity, and data analysis and interpretation. Prerequisite: introductory statistics course. Offered: Sp.

T C 517 Usability Testing (3) *Ramey* Discusses the human-computer interface (HCI) as the communicative aspect of a computer system. Analyzes usability issues in HCI design, explores design-phase methods of predictability, and introduces evaluative methods of usability testing. Prerequisite: substantial experience with computers and graduate standing, or permission of instructor. Offered: W.

T C 520 Technical Communication Management (3) Emphasizes the role and function of communication as a key to understanding organizational frameworks and managerial practices. Traditional and innovative approaches to viewing and managing technical communication. Roles, responsibilities, impact of technology. Prerequisite: T C graduate standing or permission of instructor. Offered: Sp.

T C 521 Seminar: Current Issues in Technical Communication (1-2, max. 3) Presentations on current issues in technical communication. Credit/no credit only. Prerequisite: T C graduate student status or permission of instructor. Offered: ASP.

T C 525 Assessing Communications Technologies (3) *Bereano* Analysis of development, deployment of new communication technologies; emphasis on public policy issues they present (e.g., videotelephone, mobile telephoning, hypermedia, electronic message transfer, virtual reality). Impacts explored include: access, privacy, civil liberties; power of elites; changes in social organization. Prerequisite: 425 or other background in policy analysis, technology, and society. Offered: even years; Sp.

T C 530 Technical Japanese 1 (4) *Kato* Focus on oral communication and reading. Students review and strengthen their basic knowledge of grammar and kanji and apply this to practical communication situations and technical reading. Lab work required for kanji building, grammar review, and oral drills. Japanese word-processing introduced. Prerequisite: JAPAN 213 or equivalent. Offered: A.

T C 531 Technical Japanese 2 (4) *Kato* Focus on oral communication and reading. Additional vocabulary and kanji necessary for practical communication and technical reading are introduced. Lab work required for kanji building, grammar review, and oral drills. Prerequisite: 530. Offered: W.

T C 532 Technical Japanese 3 (4) *Kato* Focus on oral communication and reading. Additional vocabulary and kanji necessary for practical communication and technical reading are introduced. The course also prepares students for internships in Japan. Lab work required for kanji building, grammar review, and oral drills. Prerequisite: 531. Offered: Sp.

T C 536 Advanced Technical Japanese 1 (4) *Kato, Tsutsui* Focuses on reading and oral/aural skills in technical Japanese. Develops advanced reading skills, technical vocabulary in the student's specialty, and skills for technical presentation, discussion, and presentation comprehension. Introduction of technical translation. Lab work is required for oral communication and vocabulary building. Prerequisite: 532. Offered: W.

T C 537 Advanced Technical Japanese 2 (4) *Kato, Tsutsui* Focuses on reading and oral/aural skills in technical Japanese. Further development of advanced reading skills, technical vocabulary in the student's specialty, and skills for technical presentation, discussion, and presentation comprehension. Training in technical translation from Japanese to English. Lab work is required. Prerequisite: 536. Offered: Sp.

T C 598 Special Topics (1-5, max. 6) Prerequisite: permission of instructor.

T C 599 Special Projects (1-5) Written report required. Prerequisite: permission of graduate adviser or committee chair. Offered: AWSpS.

T C 600 Independent Study or Research (*) Written report required. Prerequisite: permission of committee chair. Offered: AWSpS.

T C 601 Internship (2-9, max. 9) Written report required. Prerequisite: permission of committee chair. Offered: AWSpS.

T C 700 Master's Thesis (*) Prerequisite: permission of thesis adviser. Offered: AWSpS.

College of Forest Resources

Acting Dean

Dale W. Cole
102A Anderson

Associate Dean for Academic Affairs

Robert G. Lee
107B Anderson

Founded 1907, when professional forestry education was in its infancy, the College holds a position of national and international leadership in both instruction and research. Its location in one of the world's largest forest regions provides unique opportunities for field classes and research, actual management of forested lands, exposure to wood-based industries, and awareness of resource-use issues. Enrolled in the College are over 300 undergraduate and approximately 200 graduate students, taught by more than 50 faculty members. Thus, students enjoy small classes and close association with faculty, as well as the diversity and superior facilities of a large university.

College Facilities

The College occupies three buildings: Alfred H. Anderson Hall, the Hugo Winkenwerder Forest Sciences Laboratory, and Julius H. Bloedel Hall. In addition, the Center for Urban Horticulture occupies a building complex at Union Bay. Thus, the College has excellent areas and equipment for scientific laboratories, classrooms, seminar rooms, special collections, and administrative offices.

The Forest Resources Library, a branch of the University's Suzzallo Library, houses more than 26,000 bound volumes and 33,000 pamphlets, reports, and monographs. It also has an excellent collection of approximately 2,500 periodicals and many indexes to current literature in forestry and supporting sciences. Under the nationwide Farmington Plan, sponsored by the Special Library Association, the Forest Resources Library has assumed responsibility for collecting foreign material published in the fields of forestry and pulp and paper technology, providing an unusual opportunity for academic research. The Center for Urban Horticulture also maintains a library. Its herbarium supplements forest resources students' fieldwork in dendrology. Containing representative plant material from all parts of the United States, the collection includes dried, mounted specimens of shrubs, hardwood trees, and conifers. Fruit specimens and a complete cone collection of American conifers are maintained apart from the mounted collection. Another herbarium, complete in range plants and maintained by the Department of Botany, is available for use by forest resources students.

The laboratory facilities of the College represent an extensive array of modern equipment for research. The many available research tools include optical equipment, electronic instrumentation for a wide variety of uses, gas chromatographs, spectrophotometers, and physical test equipment. Specific laboratories are designed to study soil chemistry and soil physics, hydrology, polymer chemistry, meteorology, tree physiology, genetics, wood and extractives chemistry, physics of fibrous composites, applied mechanics, wood process technology, pathology, entomology, recreation, horticultural physiology, and horticultural plant materials. The College computing facilities include a remote input-output connection with the main University com-

puters, microcomputer systems dedicated to a specific research area, and a microcomputer student laboratory.

Office of Student Services

Assistant Dean for Student Affairs

Charlie Renfrow-Starry
116 Anderson

The Office of Student Services assists both undergraduate and graduate students in the College of Forest Resources in all aspects of advising, including interpretation of College and University requirements and assistance in course registration to meet graduation requirements. Faculty advisers are available to assist students in choosing elective courses which will help them build an appropriate academic background for their chosen professional specialty. A Mentor Program is also administered by the Office of Student Services and assists undergraduate students in establishing mentoring relationships with faculty, graduate students, alumni, and industry or agency representatives.

The Office of Student Services also houses the College's Career Development Center which assists students in obtaining summer employment and internships while in school and permanent employment upon graduation. Summer work may be available through federal and state agencies and in the numerous private companies in with wood-using industry of the region. Although field experience is not required for graduation, students are strongly urged to seek summer employment relevant to their major and career goals. As in any applied technical field, practical experience is as important as academics in preparing for a professional career.

The College Scholarship and Financial Assistance Program is also housed within the Office of Student Services. Through the generous donations of alumni and friends, the College has established scholarships and loan programs to assist students in paying for their tuition. Scholarships, which typically pay the cost of in-state tuition only, are awarded on the basis of academic merit. Students seeking information about financial aid offered outside the College should contact the Office of Student Financial Aid, 105 Schmitz. The Washington Pulp and Paper Foundation, Inc. provides scholarships for students enrolled in the pulp and paper science curriculum, with awards based on professional promise and scholastic achievement. The foundation is supported by companies of the pulp and paper industry and by supplier companies. Information about pulp and paper scholarships may be obtained from Professor William McKean, 318 Bloedel.

Institute of Forest Resources

Acting Director

Dale W. Cole
102A Anderson

The overall research program of the College is administered by the Institute of Forest Resources. Because of the size and complexity of this program, the Institute assumes a broad scope of responsibility and provides vital support to the College administration, faculty, staff, and students. Major functions include administering all research projects funded by federal, state, and private agencies, monitoring the McIntire-Stennis research program, ensuring College compliance with federal reporting requirements, and producing College publications and special research reports.

Institute staff coordinate and facilitate the submission of research proposals for the faculty with the University administration and numerous funding agencies. Students earn research and thesis credit toward advanced degrees by working on major forest resources problems supported by grants or contracts. Graduate and undergraduate employment related to research is arranged by the Institute office.

Areas of current and future research include a broad array of topics including forest policy analysis, stand management, streamside and riparian zone management, forest ecosystem analysis, international trade in forest products, forest products marketing, forest biotechnology, wildlife science, urban horticulture, forestry engineering and hydrology, and pulp and paper science. Topics of study are selected not only to foster the interests of individuals and groups in the region, but also to promote the scientific community at large. Research projects include studies by individual faculty, as well as interdisciplinary programs, which combine the interests of College faculty with those from other academic units of the University.

The College also collaborates with Cooperative Extension of Washington State University to undertake and promote continuing education for citizens of the state, particularly in the nonindustrial forestry area.

The Institute Publications Office provides a wide range of services in producing College research publications: technical editing, desktop publishing systems, format and layout design, computer graphics, printing/publishing coordination, distribution, advertising, and sales. College publications are distributed to national and international institutions and libraries, as well as to forestry professionals, to organizations in the private sector, and to the general public.

Field Research Areas and Facilities

The College field facilities include two major forested areas covering more than 4,000 acres, an arboretum, a reserve, and several cooperative research centers and stations. These lands offer a wide variety of terrestrial and aquatic characteristics favorable to a full range of scientific investigations. They also provide a general natural science laboratory for the many disciplines in the College specifically related to, or concerned with, the research and teaching of natural resources behavioral patterns and management.

The Charles Lathrop Pack Demonstration Forest of approximately 4,200 acres is located 65 miles south of the University, near Eatonville. This forested property is the focal point for on-the-ground academic work in forest management, resource science, and forest engineering, both at the undergraduate and graduate levels. Broad forest and soil diversity has led to extensive biological, management, and engineering research, much of which may be characterized as a "pioneering effort." A full-time resident staff manages this facility, harmonizing its demonstration objectives with academic and research objectives. Rustic, but comfortable, facilities which provide housing and support to academic and research programs also are used extensively for conferences both within and outside the University.

The Olympic Natural Resources Center (ONRC) is a 19,000 square foot research and education facility located on the west side of the Olympic Peninsula. The mission of the Center is to conduct research and education on natural resources management practices which integrate ecological and economic values. A forest management program as well as a marine program are being developed to study the relationship between the terrestrial and marine environment. The purpose of the Center is to demonstrate innovative management methods which integrate environmental and economic interests into pragmatic management of forest and ocean resources.

The Lee Memorial Forest, of approximately 160 acres, is located about 22 miles northeast of the University near Malby. This forested property provides valuable academic and research opportunities near the campus. Characterized by forest types and soils common to western Washington lowlands, Lee Forest is used extensively for part-day trips and for research and demonstration projects especially useful in a land base where long-term study commitments are difficult to achieve.

The Allan H. Thompson Research Center and the Joe E. Monahan Findley Lake Reserve and Research Area in the Cedar River watershed are utilized by the College in cooperation with the water department of Seattle for studies in forest hydrology and mineral cycling in the forest ecosystem.

The Center for Urban Horticulture has offices, laboratories, public resources, and field sites for teaching and experimentation along the shore of Union Bay. Its 10-acre Union Bay Gardens, for research, teaching, and display, currently emphasize unusual woody landscape plants. The 50-acre Ecological Research Natural Area, a former dumpsite now a naturalized habitat, is utilized by classes and the public to study principles and practices of restoration ecology. The Douglas Research Conservatory is a modern plant-growing facility with greenhouses, growth chambers, nursery, and classrooms. The Otis Douglas Hyde Hortorium is the fastest growing herbarium dedicated to plants of urban horticultural significance. The Elisabeth C. Miller Horticultural Library is the Northwest's foremost public horticultural library, with books, journals, and other materials for the gardening public, students, and professional horticulturists. The Center also conducts courses, lectures, and special events for the public and professionals as part of the College's Continuing and Public Education programs. This is done in collaboration with Washington State University/King County Cooperative Extension, whose horticulture program is housed at the Center.

The Center's largest facility is the Washington Park Arboretum, a 200-acre collection of trees and shrubs growing in a naturalistic setting on the south shore of Lake Union. Managed in cooperation with the City of Seattle Department of Parks and Recreation, the Arboretum contains some 5,200 different kinds of woody plants that are available for research and academic study. The Arboretum was established in 1934 and many of its original specimens are now approaching maturity. Classes in botany, dendrology, horticulture, and landscape architecture make use of the collections, while the grounds are used for studies in soil science, ecology, and various research projects, including many independent student projects. The Arboretum also serves as an important public service area to the University, offering various formal and informal classes for the general public and, in addition, serving the community as a public park and as open space.

Forest Management and Engineering Division

Chair

Gerard F. Schreuder
296 Bloedel

Courses for which the Forest Management and Engineering Division is responsible deal with the management of forest resources and its many multiple uses, including timber, water, wildlife, and recreation. Forest land uses range from bioresearch, wilderness, and national parks to watershed and tree farms. Courses in the forest engineering curriculum emphasize the scientific and engineering design principles that will enable graduates to find technical solutions to problems facing forest resources, forestry-related enterprises, and rural communities. Course subjects include silviculture, economics, business, sociology, computer applications, hydrology, measurements, and engineering.

The Division of Forest Management and Engineering offers two undergraduate curricula leading to the Bachelor of Science in Forest Resources: forest management and forest engineering, which is offered jointly with the College of Engineering. Forest management emphasizes the management and multiple-use of forest resources and forest land. Forest engineering is a profession in which knowledge of the mathematical and natural sciences gained by study and experience

is applied with judgment to design systems and processes to meet society's many demands from forested landscapes. Forest engineers design timber harvest, road construction, watershed protection, and resource enhancement activities over a wide variety of space and time scales. The overall goal of the forest engineering curriculum is to provide the highest quality education in engineering principles as well as forest ecosystems in an undergraduate degree program.

The objectives of the curriculum are to: (1) provide a broad education, including a strong liberal arts background emphasizing critical thinking and life-long learning, which will enable students to be informed, responsible, and effective professionals in society; (2) develop students' written and oral communications skills so that they can organize and express information and ideas logically and convincingly; (3) develop students' understanding of fundamental scientific principles, including forest science and ecology, which serve as a sound basis for the synthesis of knowledge leading to rational problem-solving; (4) develop students' knowledge and ability to employ engineering methods including analysis, computation, modeling, experimental techniques, and design to solve forest engineering problems; and (5) develop students' understanding of their legal, ethical, and professional relationships with society to prepare them for the professional practice of forest engineering.

The components of the program include (1) mathematics—24 credits, (2) natural sciences—25 credits, (3) written and oral communications—12 credits, (4) engineering fundamentals—24 credits, (5) Visual, Literary & Performing Arts—30 credits, (6) forest engineering core courses—63 credits, and (7) technical electives—14 credits. Technical electives must fall in one of the following areas: industrial forest operations, remote sensing and data management, or environmental analysis and design.

While the first two years of the forest engineering curriculum are consistent with pre-engineering status within the University, and the core forest engineering courses begin in the junior year, design is a theme that is emphasized throughout the program. The design theme culminates in the senior year when all forest engineering students spend spring quarter in the field completing a design project. Students are housed at the College's Charles Lathrop Pack Demonstration Forest. This "capstone design course" allows students to participate in a real-world, team-oriented design project combining most, if not all, aspects of their studies. The project typically involves preparation of a watershed resource development and transportation plan for a large forested area and includes extensive use of computer technology, environmental assessment methods, and road location and forest operations design.

Graduate programs leading to the Master of Science and Doctor of Philosophy degrees are offered by this division and include social sciences, forest economics, forest engineering, forest hydrology, forest products marketing, silviculture and forest protection, and quantitative resources management. A practice-oriented degree leading to the Master of Forest Resources in the area of silviculture is also available.

Ecosystem Science and Conservation Division

Chair

Robert L. Edmonds
264 Bloedel

Courses included in the Ecosystem Science and Conservation Division cover basic and applied subject matters in forest biology. Subjects covered include plant and animal ecology, wildlife biology and conservation, dendrology and autecology, soils and ecosystem analysis.

The Division of Ecosystem Science and Conservation offers two undergraduate curricula leading to the Bachelor of Science in Forest Resources: wildlife science and conservation of wildland resources. Wildlife science focuses on the application of ecological knowledge to wildlife biology and management, with the intent of preparing students for graduate education in wildlife science. The conservation of wildland resources undergraduate curriculum provides a broad education in forest-related natural resources. It emphasizes vegetation and animal components of ecosystems and how they interact with environmental and social components.

Graduate programs leading to the Master of Science and Doctor of Philosophy degrees include ecosystem analysis (ecology, soils and mineral cycling, tree physiology) and wildlife science.

Paper Science and Engineering Division

Chair

Bjorn F. Hrutford
332 Bloedel

Courses for which the Paper Science and Engineering Division is responsible include those in pulp and paper processing, pulping chemistry, wood and fiber utilization and their properties, and wood chemistry.

The Division of Paper Science and Engineering administers an undergraduate curriculum in the area of paper science and engineering as well as a graduate curriculum leading to the Master of Science and Doctor of Philosophy in the area of paper science and engineering.

Urban Horticulture Division

Chair

Clement W. Hamilton
119 Merrill

The Urban Horticulture Division is concerned with the selection, management, and role of plants and of ecosystems in urban environments. Faculty members participate in research, education, and public service programs and teach students in the undergraduate urban forestry curriculum as well as in the graduate programs in urban horticulture.

The faculty offers expertise in horticultural taxonomy and plant materials, landscape plant science and management, urban ecology and restoration biology, continuing education, and public garden curation and management.

Undergraduate Program

In addition to the University's general admission requirements, students who plan to enter the College of Forest Resources should have completed Algebra III (Intermediate), trigonometry, and at least one unit each of biological and physical science.

The College of Forest Resources offers six undergraduate curricula leading to a Bachelor of Science in Forest Resources degree: forest management, wildlife science, conservation of wildland resources, forest engineering, paper science and engineering, and urban forestry.

The first two years of study emphasize general preparation, followed by an upper-division professional program. Each curriculum contains a number of elective

credits selected by the student with the assistance of faculty advisers. Students are encouraged to take a number of these credits outside the College to broaden their preparation.

In addition to University regulations concerning requirements and grading, College regulations state that no required course may be taken on a satisfactory/not satisfactory basis. Some classes include field trips, laboratory supplies, or material duplication at extra expense to the students.

Students interested in forest management should note that senior-level course work may be taken only after completion of the required field camp at Pack Forest.

Students planning to enter the College from community colleges or from other universities should check with their advisers to ensure their prior programs of study include the proper prerequisites.

Student advising is the joint responsibility of the College's Office of Student Services, 116 Anderson, and the divisions. Student files are centrally located in the Office of Student Services.

Pack Forest Residential Field Classes

Students enrolled in the forest management and forest engineering curricula must attend the Pack Forest program. This program is typically completed during the spring of the junior year for forest management students and during the spring of the senior year for forest engineering students. Courses are conducted as part of the field residential program at the Charles Lathrop Pack Demonstration Forest near LaGrande, 65 miles from Seattle.

Students taking course work at Pack Forest must live at the field residential station, paying room-and-board charges in addition to regular tuition. Information is available from the Office of Student Services, 116 Anderson.

Accreditation

The curriculum in forest management is accredited by the Society of American Foresters (SAF). Other curricula include electives that may be used toward qualifications for SAF and the Forester rating for the United States Civil Service.

The curriculum in forest engineering leading to the Bachelor of Science in Forest Resources is currently being reviewed for accreditation from the Accreditation Board for Engineering and Technology (ABET).

SAF and ABET are recognized by the Council on Postsecondary Accreditation and the U.S. Department of Education as the accrediting agencies for forestry and engineering, respectively, in the United States.

Students should consult with advisers in planning their schedules to include the specific class requirements for SAF and civil service qualifications.

Bachelor of Science in Forest Resources

For information concerning the general education, lower-division, and upper-division (major) requirements, see a College adviser in the Forest Resources Office of Student Services, 116 Anderson.

Conservation of Wildland Resources

General Education Requirements: English Composition—5 credits from the University list (ENGL 131 is preferred); writing intensive courses—7 credits minimum to include ESC 495 (5 credits) and 2 credits of additional writing-intensive course work; Visual, Literary, & Performing Arts—10 credits to include SP CMU 220 (5) or other College-approved course from University VLPAL list plus 5 additional credits from University VLPAL list; Individuals & Societies—18 credits to in-

clude ECON 200 (5); POL S 202 (5); F M 370 (3), and F M 470 (5) or other College-approved courses from University I&S list.

Lower-Division Requirements: CFR 101 (5 credits); Q SCI 291, 292 (5, 5) or MATH 124, 125 (5, 5); Q SCI 381 (5); CHEM 120 (5); CHEM 220 (5); GEOL 101 (5); BIOL 101 (5); BIOL 102 (5); PHYS 114 (4); PHYS 117 (1); Free Electives (27).

Upper-Division (Major) Requirements: ESC 202 (5 credits); ESC 210 (4); ESC 221 (6); ESC 322 (3); ESC 350 (4); Restricted/Directed Electives (48).

Minor

Minor Requirements: Minimum 35 credits to include CFR 101 (5 credits); ESC 200 (5); ESC 202 (5) or F M 324 (5); ESC 210 (4); ESC 320 (5); ESC 322 (3); F M 328 (4); ESC 350 (4). Recommended additional courses include ESC 221 (6); ESC 411 (4); ESC 421 (4); ESC 441 (5).

Forest Engineering

General Education Requirements: English Composition—5 credits from the University list (ENGL 131 is preferred); writing intensive courses—7 credits minimum to include ENGR 231 (3 credits) and ENGR 333 (4) or other writing courses as approved by the College of Engineering and the College of Forest Resources; 30 credits total from Visual, Literary, & Performing Arts list and from Individuals & Societies list including a minimum of 10 credits from each of these two Areas of Knowledge.

Lower-Division Requirements: CHEM 140, 141 (4 credits, 1 credit); CHEM 150, 151 (4, 1); MATH 124, 125, 126 (5, 5, 5); MATH 307 (3); MATH 308 (3); PHYS 121/131 (4/1); PHYS 122/132 (4/1); PHYS 123/133 (4/1); CSE/ENGR 142 (4); ENGR 123 (4); ENGR 210 (4); ENGR 220 (4); ENGR 230 (4); ENGR 250 (4); ENGR 315 (3).

Upper-Division (Major) Requirements: F E 330 (4 credits); F E 332 (4); F E 341 (5); F E 340 (4); F E 346 (5); F E 368 (4); F E 425 (4); F E 444 (4); F E 450 (15); F E 470 (3); F E 480 (3); CIVE 342 (4); CIVE 368 (4); Restricted/Directed Forest Engineering Electives (14).

Forest Management

General Education Requirements: English Composition—5 credits from the University list (ENGL 131 is preferred); writing intensive courses—7 credits minimum to include F M 496 (5 credits) and 2 credits of additional writing-intensive course work; Visual, Literary, & Performing Arts—10 credits to include SP CMU 220 (5) or other College-approved course from University VLPAL list and 5 additional credits from the University VLPAL list; Individuals & Societies—20 credits to include ECON 200 (5); ECON 201 (5); POL S 202 (5); F M 370 (3), and F M 470 (5) or other College-approved courses from University I&S list.

Lower-Division Requirements: CFR 101 (5 credits); ESC 210 (4); ESC 221 (6); MATH 124 (5); CFR 250 (5); Q SCI 381 (5); CHEM 120 (5); CHEM 220 (5); GEOL 101 (5); BIOL 101 (5); BIOL 102 (5); Free Electives (10).

Upper-Division (Major) Requirements: F M 270 (3 credits); F M 323 (5); F M 324 (5); F M 328 (4); F M 360 (5); F M 362 (5); F M 425 (3); F M 481 (3); F E 345 (5); ESC 322 (3); ESC 350 (4); Restricted Business/Management Electives (15); Free Electives (12).

Minor

Minor Requirements: Minimum 35 credits to include Biology—minimum 9 credits from: ESC 200 (5 credits); ESC 210 (4); ESC 322 (3); F M 328 (4); ESC 350 (4); Social Sciences—minimum 9 credits from: F M 270 (3); F M 370 (3); F M 470 (5); F M 360 (5); F M 421 (3); F M 422 (3); F M 423 (3); Forest Management—minimum 9 credits from: CFR 101 (5); CFR 250 (5); F M 323 (5); F M 324 (5); F M 362 (5); F M 481 (3); F M 377 (3); F M 425 (3); F E 345 (5); Electives—minimum 8 credits from any F M course at the 300 level or above.

Pulp and Paper Science

General Education Requirements: English Composition—5 credits from the University list (ENGL 131 is preferred); writing intensive courses—7 credits minimum; Visual, Literary, & Performing Arts—10 credits from University VLPAL list; Individuals & Societies—10 credits to include ECON 200 (5 credits) or other College-approved course from University I&S list and 5 additional credits from University I&S list.

Lower-Division Requirements: CHEM 140, 141 (4 credits, 1 credit); CHEM 150, 151 (4, 1); CHEM 160 (4); CHEM 237 (4); CHEM 238 (4); MATH 124, 125, 126 (5, 5, 5); MATH 307 (3); Q SCI 381 (5); PHYS 121/131 (4/1); PHYS 122/132 (4/1); PHYS 123/133 (4/1); CSE/ENGR 142 (4); ENGR 260 (4); PSE 302 (4); PSE 306 (3).

Upper-Division (Major) Requirements: CHEM 455 (3 credits); CHEM 457 (3); CHE 310 (4); CHE 330 (4); CHE 340 (4); CHE 436 (3); PSE 400 (3); PSE 401 (2); PSE 402 (3); PSE 406 (3); PSE 407 (2); PSE 476 (3); PSE 477 (3); PSE 478 (2); PSE 479 (2); PSE 480 (3); PSE 481 (3); PSE 482 (3); PSE 485 (1-1-1); PSE 483 (3) or PSE 488 (3); PSE 497 (1-2). Restricted/Directed Electives (15).

Urban Forestry

General Education Requirements: English Composition—5 credits from the University list (ENGL 131 is preferred); writing intensive courses—7 credits minimum to include UHF 495 (5 credits) and 2 credits of additional writing-intensive course work; Visual, Literary, & Performing Arts—10 credits to include SP CMU 220 (5) or other College-approved course from University VLPAL list and 5 additional credits from University VLPAL list; Individuals & Societies—10 credits to include ECON 200 (5) and POL S 202 (5) or other College-approved course from University I&S list.

Lower-Division Requirements: Q SCI 291 (5 credits) or MATH 124 (5); Q SCI 381 (5); CHEM 120 (5); CHEM 220 (5); GEOL 101 (5); BIOL 101 (5); BIOL 102 (5); PSYCH 102 (5); UHF 201 (3); UHF 202 (3); Free Electives (15).

Upper-Division (Major) Requirements: UHF 331 (3 credits); UHF 411 (3); UHF 431 (5); UHF 444 (5); UHF 445 (5); UHF 451 (5); UHF 470 (5); UHF 471 (3); ESC 210 (4); ESC 311 (3); F M 270 (3); BOTANY 371 (3); BOTANY 354 (5); L ARCH 322 (3); L ARCH 341 (3); Restricted/Directed Electives (36).

Wildlife Science

General Education Requirements: English Composition—5 credits from the University list (ENGL 131 is preferred); writing intensive courses—8 credits minimum to include ESC 494 (3 credits) and ESC 496 (5); Visual, Literary, & Performing Arts—10 credits to include SP CMU 220 (5) or other College-approved course from University VLPAL list and 5 additional credits from University VLPAL list; Individuals & Societies—10 credits minimum to include ECON 200 (5) or other College-approved course from University I&S list and 5 additional credits from University I&S list.

Lower-Division Requirements: ESC 101 (1 credit); ESC 210 (4); ESC 221 (6); Q SCI 291, 292 (5, 5) or MATH 124, 125 (5, 5); Q SCI 381 (5); PHYS 114 (4); PHYS 117 (1); CHEM 120 (5); CHEM 220 (5); GENET 371 (5) or College-approved substitute; BOTANY 113 (5); BIOL 101 (5); BIOL 102 (5); Free Electives (5).

Upper-Division (Major) Requirements: ESC 322 (3 credits); ESC 326 (5); F M 370 (3); ESC 350 (4); ESC 351 (3); ESC 450 (5); ESC 455 (1, 1), to be taken twice; Q SCI 477 (5); Q SCI 482, 483 (5, 5); Restricted/Directed Electives (41).

Minor

Minor Requirements: Minimum 25 credits to include ESC 101 (1 credit); ESC 322 (3); ESC 326 (5); ESC 350 (4); ESC 450 (5); ESC 455 (1, 1), to be taken twice; 5-6 credits selected from: ESC 451 (3); ESC 452 (3); ESC 453 (5); ESC 454 (3).

Graduate Programs

Robert G. Lee, Graduate Program Coordinator

Graduate programs in forest resources are designed to accommodate a wide range of education and career objectives. A student may concentrate on development of advanced professional skills and knowledge or on exploration of sciences basic to forest resources.

Graduate programs offered in forest resources lead to degrees of Master of Forest Resources, Master of Science, and Doctor of Philosophy. Graduate students may center their graduate study in one of the special fields of study within the College divisions.

Master of Forest Resources

The Master of Forest Resources degree is a professional degree offered for students who wish to acquire a greater competence in a specific subject area of forest resources. This is a nonthesis option open to professionals who are returning to study and obtain expertise in areas such as silviculture and urban horticulture. Interested persons should contact the graduate program coordinator to determine eligibility for this degree program.

Master of Science

The Master of Science degree is a learned degree, often precursory to the Doctor of Philosophy degree. Some areas of study allow nonthesis work while most areas of study require the completion of a thesis. The nonthesis program requires at least 6 credits of research and the thesis program requires a minimum of 9 credits of research. A foreign language is not required. Students must complete a set of core courses prescribed for the major area of study.

Doctor of Philosophy

The Doctor of Philosophy degree may be preceded by education in either forest resources or another discipline. The program comprises an appropriate selection of core courses in forest resources and in the related natural and social sciences. The program requires passage of the General Examination in forest resources; research, analysis, and interpretation; and completion of the dissertation. A minimum of two years of residence at the UW also is required. The time necessary to complete the degree requirements depends upon the thoroughness and applicability of prior course work. Reading proficiency in one foreign language may be required by the Supervisory Committee when the language is essential to the student's program of study.

Mid-Career Education

The College has established a non-degree certificate program in silviculture to provide mid-career education for forestry professionals. Participants in the mid-career program take courses to prepare themselves for new or broader responsibilities in their current career. In this certificate program, courses can be taught in a more flexible time arrangement to meet the specific career and scheduling needs of participants. Interested forestry professionals should contact the College of Forest Resources Continuing Education Office.

Graduate Areas

Graduate education is offered through the academic divisions of Forest Management and Engineering, Ecosystem Science and Conservation, Paper Science and Engineering, and Urban Horticulture. Major areas of study and emphasis include: pulp and paper science (pulp and paper engineering, wood chemistry, polymer and fiber science); forest engineering; forest hydrology; forest products marketing; forest economics; forest ecosystem analysis (forest ecosystems, forest ecology, forest genetics, forest soils/mineral cycling, streamside/riparian management, tree physiology); quantitative resources management (biometry, quantitative management, aerial photogrammetry/remote

sensing); silviculture and forest protection (silviculture, forest entomology, fire management, forest pathology); social sciences (forest land use planning, forest policy and law, forest sociology and leisure studies); wildlife science; urban horticulture (environmental horticulture, horticultural taxonomy, horticultural physiology, wetlands management).

In all areas of study, the College maintains a close working relationship with faculties of other colleges and schools throughout the University, including service on graduate committees. Faculty advisers assist graduate students in determining those courses in other departments on campus which will lend to students' intended areas of expertise.

Admission Qualifications, Background

A student who intends to work toward an advanced degree must apply for admission to the Graduate School and must meet the requirements set forth by the Graduate School and by the College of Forest Resources.

Basic requirements for admission to the Graduate School are a baccalaureate degree from an institution of recognized standing, a minimum GPA of 3.00 in the junior and senior years of college work, approval of the Dean of the Graduate School, and approval of the faculty of the College.

In addition to requesting admission forms from the Graduate Admissions Office, an applicant should obtain supplemental admission and reference forms from the College of Forest Resources. The Graduate Record Examination general test is required, and test scores must be submitted to the College by the applicant.

Upon enrollment, the student is assigned a graduate program committee that is responsible for guidance in the early stages of the graduate program, to be followed by more formal committees as the student's program develops.

Applicants for the College are considered quarterly within the enrollment limitations for the College and the available faculty and workload limitations within the specific program area of study selected. Students with both undergraduate forestry degrees and other related fields are considered, although a prior forestry degree is normally expected of applicants for the professional Master of Forest Resources degree.

Financial Aid

The College has available a limited number of appointments as research assistants. Teaching and research responsibilities allow time to pursue a full academic load. Fellowships and scholarships without teaching or research obligations are also available. Requests for financial aid should be submitted by February 1 for priority consideration for the following academic year.

Correspondence and Information

Office of Student Services

116 Anderson, Box 352100

Research Centers

Center for Quantitative Science in Forestry, Fisheries, and Wildlife

The Center for Quantitative Science in Forestry, Fisheries, and Wildlife (CQS) is an intercollege academic unit sponsored by the College of Forest Resources and the School of Fisheries of the College of Ocean and Fishery Sciences. The Center offers a comprehensive program of study in mathematics and statistical methods as applied to problems in ecology and natural resource management. The faculty of the Center include members of the College of Forest Resources and the School of Fisheries, and many are also adjunct members of the departments of Biostatistics and Statistics.

Center for International Trade in Forest Products

Director

Bruce R. Lippke

The Center for International Trade in Forest Products (CINTRAFOR) was established in 1984 to respond to opportunities and problems relating to the export and import of wood products. Through programs of research, education, and outreach, CINTRAFOR works to improve knowledge of export trade and to train professionals competent in the analysis and interpretation of trade problems, issues, and policies. The Center serves as a focal point for dissemination of information on world trade in forest products by means of seminars, conferences, workshops, and publications.

CINTRAFOR activities involve the cooperative effort of the forest products industry, state and federal organizations, and other organizations at the University such as the School of Business Administration and the Northwest Policy Center. The research undertaken by CINTRAFOR includes country market analyses, global competitive models, new product and market opportunities, the linkages between global forest products trade and environmental impacts and socioeconomic stability, and policy impact analyses.

Students interested in participating in specific research activities sponsored by CINTRAFOR may enroll for study in graduate programs in one of the College's four academic divisions or in programs offered by other academic divisions on campus.

Center for Streamside Studies

Director

Robert J. Naiman

The Center for Streamside Studies (CSS) was established in 1987 as a joint effort of the College of Forest Resources, the College of Ocean and Fishery Sciences, and the Center for Quantitative Science in Forestry, Fisheries, and Wildlife. CSS provides information for the resolution of management issues related to the production and protection of forest, fish, wildlife, and water resources associated with the streams and rivers in the Pacific Northwest.

The Center conducts research activities related to the understanding of ecological and physical processes and their relation to governmental regulations. Projects are solution-oriented, centering around biological, physical, and social aspects of management issues. Cooperative projects are undertaken with state and federal agencies, tribes, private industry, and national and international research institutions, and involve faculty and students of the College of Forest Resources, the College of Ocean and Fishery Sciences, and the Center for Quantitative Science in Forestry, Fisheries, and Wildlife.

To provide interdisciplinary training necessary to deal with the management of interacting resources, CSS conducts symposia, workshops, conferences, and seminar series as forums for resource conflict discussion and resolution. Students interested in participating in specific research activities sponsored by CSS may enroll for study in graduate programs in one of the College of Forest Resources' four academic divisions or in programs offered by other academic divisions on campus.

Olympic Natural Resources Center

Director

John Calhoun

The mission of the Olympic Natural Resources Center (ONRC) is to conduct research and education on natural resource management practices which integrate ecological and economic values. Created by the

Washington State Legislature in 1989, the Center conducts biological, physical, economic, and social science research in both terrestrial and coastal/marine systems. The Center's programs span a spectrum from developing new knowledge through basic and applied research to education and outreach.

Much of the Center's work is conducted cooperatively with other research institutions, state and federal agencies, resource owners, and interest groups. The Center is housed in facilities at Forks, Washington on the Olympic Peninsula, and the natural resources of the area are a major focus of the work of the Center. The Center is jointly administered by the College of Forest Resources and the College of Ocean and Fishery Sciences.

Faculty

Professors

- Agee, James K. * 1982; PhD, 1973, University of California (Berkeley); management of natural systems, forest ecology, fire ecology.
- Allan, G. Graham * 1966; PhD, 1956, University of Glasgow (UK); DSc, 1971, University of Strathclyde (UK); fiber and polymer science, creativity and innovation.
- Ammirati, Joseph F. * 1979, (Adjunct); MA, 1967, San Francisco State; PhD, 1972, University of Michigan; mycology, taxonomy and ecology of fungi.
- Bare, B. Bruce * 1969; MS, 1965, University of Minnesota; PhD, 1969, Purdue University; harvest scheduling, biometry, forest land management, taxation, finance, management science.
- Bethel, James S. * 1962, (Emeritus); PhD, 1947, Duke University; wood science, wood energy, international forestry.
- Bradley, Gordon A. * 1972; PhD, 1986, University of Michigan; forest land use planning, recreation site planning and design.
- Briggs, David G. * 1973; PhD, 1980, University of Washington; operations research in forest products industries.
- Brubaker, Linda B. * 1973; PhD, 1973, University of Michigan; dendrochronology, forest ecology, quaternary paleoecology.
- Bryant, Benjamin S. * 1949, (Emeritus); DF, 1951, Yale University; wood utilization technology, wood gluing, plywood and board technology.
- Cole, Dale W. * 1958; MS, 1957, University of Wisconsin; PhD, 1963, University of Washington; mineral cycling in forest ecosystems, forest soils.
- Dowdle, Barney * 1962; PhD, 1962, Yale University; markets for timber and forest products, public forest land management.
- Edmonds, Robert L. * 1973; PhD, 1971, University of Washington; forest soil microbiology, biology of forest diseases, aerobiology.
- Edwards, John S. * 1967, (Adjunct); PhD, 1960, Cambridge University (UK); arthropod neurobiology, insect physiology and development, tundra and alpine biology.
- Erickson, Harvey D. 1947, (Emeritus); PhD, 1937, University of Minnesota; wood science and technology.
- Ford, E. David * 1985; PhD, 1968, University College, London (UK); forest ecology and ecophysiology, modeling, spatial statistics.
- Franklin, Jerry F. * 1986; PhD, 1966, Washington State University; forest ecosystem analysis, vegetation patterns, tree mortality in natural landscapes.
- Fridley, James * 1988; PhD, 1984, University of Washington; forest engineering systems design, interactive computer simulation.
- Fritschen, Leo J. * 1966, (Emeritus); PhD, 1960, Iowa State University; biometeorology, micrometeorology, measurement and instrumentation of the environment.
- Gallucci, Vincent * 1976, (Adjunct); PhD, 1971, North Carolina State University; biomathematics and population dynamics.
- Gara, Robert I. * 1968; PhD, 1964, Oregon State University; bark beetle ecology, forest insect behavior, international forestry.
- Greulich, Francis E. * 1977; PhD, 1976, University of California (Berkeley); forest engineering, statistics, operations research.
- Hanley, Donald P. * 1983; PhD, 1981, University of Idaho; extension forestry, small-forest management, forestry continuing education.
- Hatheway, William H. * 1969, (Emeritus); PhD, 1956, Harvard University; quantitative ecology, physiological ecology, tropical forestry.
- Hinckley, Thomas M. * 1980; PhD, 1971, University of Washington; forest tree physiology and autecology, subalpine ecosystems, water stress problems.
- Hrutford, Bjorn F. * 1959; PhD, 1959, University of North Carolina; wood extractive chemicals, air and water quality in forest products industries.
- Johnson, Jay A. * 1983; PhD, 1973, University of Washington; mechanical and physical properties of wood and wood composite materials, wood quality.
- Jorgensen, Jens E. * 1968, (Adjunct); DSc, 1969, Massachusetts Institute of Technology; systems analysis, manufacturing, automation and controls, forest engineering.
- Lee, Robert G. * 1978; PhD, 1973, University of California (Berkeley); natural resource sociology, multiresource management, development/change of forestry institutions.
- Leney, Lawrence * 1960, (Emeritus); PhD, 1960, State College of Forestry (Syracuse); wood anatomy, microtechniques, machining wood, photomicrography, seasoning and preservation of wood.
- Leopold, Estella B. * 1976, (Adjunct); PhD, 1955, Yale University; paleoecology, pollen and seed analysis, late Cenozoic environment.
- Lettenmaier, Dennis P. * 1973, (Adjunct); PhD, 1975, University of Washington; systems analysis and water resources planning.
- Lippke, Bruce R. * 1990; MSEE, 1959, New Mexico State University; MSIE, 1966, University of California (Berkeley); international trade and environmental linkages, investment analysis, economics of forest industry.
- Manuwal, David * 1972; PhD, 1962, University of California (Los Angeles); avian ecology, effects of forest management on birds.
- McCarthy, Joseph L. * 1941, (Emeritus); PhD, 1938, McGill University (Canada); thermodynamics, lignin and cellulose, chemistry, pulp and paper science, biochemical engineering.
- McKean, William T. * 1979; PhD, 1968, University of Washington; pulp and paper science, chemical engineering.
- Naiman, Robert J. * 1988; PhD, 1974, Arizona State University; forest stream ecosystems, aquatic landscape dynamics.
- Oliver, Chadwick D. * 1975; PhD, 1975, Yale University; silviculture and forest ecology; culture of single- and mixed-species forest stands.
- Peterson, David L. * 1989; PhD, 1980, University of Illinois; environmental stress on tree growth and forest ecosystems, subalpine forests, global climate change.
- Pickford, Stewart G. * 1976; PhD, 1972, University of Washington; forest fire science, wildland fire management.
- Richey, Jeffrey E. * 1973; PhD, 1973, University of California (Davis); quantitative problems of aquatic ecosystems, primary Amazon River, limnology.
- Ricker, Neil L. * 1978, (Adjunct); PhD, 1978, University of California (Berkeley); chemical process design, simulation, and control.
- Schaeffer, Walter H. 1952, (Emeritus); PhD, 1952, University of Washington; forestry.
- Schiess, Peter * 1975; PhD, 1975, University of Washington; forest engineering, mechanical harvest operations, forest road design and construction.
- Schreuder, Gerard Fritz * 1971; PhD, 1968, Yale University; statistical analysis in resource economics, international forestry, trade, aerial photos.
- Scott, David R. M. * 1955, (Emeritus); PhD, 1950, Yale University; silviculture, forest ecology.
- Sharpe, Grant William * 1966, (Emeritus); PhD, 1956, University of Washington; wildland recreation, interpretation and management of recreation areas.
- Sprugel, Douglas George * 1984; PhD, 1974, Yale University; community and ecosystem ecology, tree ecophysiology, subalpine systems.
- Stenzel, George 1949, (Emeritus); MF, 1939, Yale University; forest resources.
- Stettler, Reinhard F. * 1963, (Emeritus); PhD, 1963, University of California (Berkeley); genetics of forest tree populations, biotechnology, biomass production.
- Taber, Richard D. * 1968, (Emeritus); PhD, 1951, University of California (Berkeley); wildlife science.
- Thorud, David B. * 1981; MS, 1960, PhD, 1964, University of Minnesota; watershed management, international forest policy and development.
- Tukey, Harold B. * 1980; PhD, 1958, Michigan State University; urban horticulture, horticultural physiology.
- Wagar, John Alan * 1988, (Research); PhD, 1961, University of Michigan; urban forestry, urban forest inventory and cost-effective management.
- Waggoner, Thomas R. * 1969; PhD, 1966, University of Washington; policy and economics, regional impact analysis, marketing and international trade in forest products.
- Wissmar, Robert C. * 1972; PhD, 1972, University of Idaho; ecology.
- Wott, John A. * 1981; PhD, 1968, Cornell University; urban horticulture, public programs in horticulture, public gardens, arboreta.

Associate Professors

- Bradshaw, Harvey D. * 1984, (Research); PhD, 1984, Louisiana State University; plant molecular biology and genetic modification of poplars.
- Conquest, Loveday L. * 1988, (Adjunct); PhD, 1975, University of Washington; statistics in forestry, fisheries, and environmental pollution monitoring.
- Ewing, Kern * 1990; PhD, 1982, University of Washington; wetland plant ecology, urban ecology, ecosystem management.
- Ganter, Mark * 1986, (Adjunct); PhD, 1985, University of Wisconsin; solid modeling, computer graphics, kinematics and automated manufacturing.
- Grue, Christian E. * 1989, (Adjunct); PhD, 1977, Texas A&M University; wildlife toxicology, wildlife and fisheries science.
- Gustafson, Richard Roy * 1986; PhD, 1982, University of Washington; process modeling and optimization, fiber composites.
- Hamilton, Clement Wilson * 1985; PhD, 1985, Washington University; landscape plant selection, taxonomy of horticultural and tropical plants.
- Harrison, Robert B. * 1987; PhD, 1985, Auburn University; forest soil chemistry and fertility, mineral cycling.

Henry, Charles L. * 1982, (Research); PhD, 1989, University of Washington; recycling organic wastes as soil amendments.

Hodgson, Kevin T. * 1991; PhD, 1986, University of Washington; surface and colloid science, papermaking chemistry, secondary fiber recycling.

Horner, Richard R. * 1981, (Adjunct Research); PhD, 1978, University of Washington; wetlands, conservation and storm water management.

McNeel, Joseph * 1992; PhD, 1984, Virginia Polytechnic Institute and State University; forest operations, systems analysis, technology transfer.

Raedeke, Kenneth J. * 1981, (Research); PhD, 1979, University of Washington; wildlife biology and conservation, population dynamics.

Robertson, Iain M. * 1982, (Adjunct); MLA, 1975, University of Pennsylvania; designing with plants, planning and design of botanical gardens/arboreta.

Rustagi, Krishna P. * 1973; PhD, 1973, Yale University; operations research and statistical applications in resource management, forest inventory.

Strand, Stuart E. * 1982, (Research); PhD, 1982, Pennsylvania State University; forest biotechnology, environmental pollution control.

Van Blaricom, Glenn R. * 1993, (Adjunct); PhD, 1978, University of California (San Diego); aquatic wildlife, ecology of marine communities, wildlife-fisheries interactions.

West, Stephen D. * 1979; PhD, 1979, University of California (Berkeley); wildlife ecology and management, population dynamics.

Assistant Professors

Bolton, Susan M. * 1992; PhD, 1991, New Mexico State University; hydrology, watershed management.

Eastin, Ivan * 1987; PhD, 1992, University of Washington; marketing strategies and international trade of forest products.

Edwards, Richard T. * 1993, (Research); PhD, 1985, University of Georgia; aquatic ecology, biogeochemistry.

Halpern, Charles * 1991, (Research); PhD, 1987, Oregon State University; plant community ecology, plant succession, montane/subalpine meadow ecology.

Jacobs, Chavonda J. 1995, (Acting); MS, 1992, North Carolina State University; wood/paper science.

Paun, Dorothy Ann * 1993; PhD, 1993, University of Oregon; marketing of forest products, international marketing.

Perez-Garcia, John * 1990; MS, 1982, Mayaguez (Puerto Rico); DF, 1991, Yale University; analysis of trade policy, global trade modeling.

Turnblom, Eric 1994; MSc, 1986, University of British Columbia (Canada); PhD, 1994, University of Minnesota; forest biometrics; growth and yield.

Vande Castle, John * 1989, (Research); PhD, 1985, University of Wisconsin; aquatic-terrestrial ecosystem interfaces, remote sensing and geographic information systems.

Wolf, Kathleen, 1994, (Research); MLA, 1987, PhD, 1993, University of Michigan; environmental psychology, urban forest environment.

Zabowski, Darlene * 1992; PhD, 1988, University of Washington; forest soils and their productivity, soil genesis, biogeochemical cycling of soils.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

Students taking undergraduate and graduate courses, structured or unstructured, that require field trips, special laboratory supplies, or special material duplications are required to pay appropriate amounts to cover such expenses. If a student fails to pay, the transcript may be withheld and the degree may not be conferred.

CFR 101 Forests and Society (5) NW Edmonds, Gara Survey course covering forest ecosystems of the world, history of forestry and forest conservation, how forest ecosystems function, wildlife in forests, environmental issues in forestry, forest management, economics and products, and new approaches to forest management. Open to majors and non-majors. Offered: AWSpS.

CFR 250 Introduction to Geographic Information Systems in Forest Resources (5) NW, QSR Pickford Applications of GIS technology to forest science and management. Fundamentals of GIS systems: data sources, preprocessing; map analysis, output. Remote sensing as a source of GIS data, image analysis, and classification. Emphasis on GIS as a source of management and technical information requests. Prerequisite: ability to work with MS-DOS. Offered: AW.

CFR 400 Conflict Management (2) I&S/NW Emphasis on importance of personal styles of communication, common vision and goals, team building, performance analysis, bottom-line impacts, empowering of employees and of special interest groups, role of stakeholders and mediators. Regional experts from forestry-related companies as well as issues managers from various industries participate with team of instructors. Offered: W.

CFR 450 Senior Planning Project (3) Ford How to choose a topic, develop a written plan, prepare for field or laboratory work, and write the senior project. Projects may be related to resource management, conservation, or scientific research. Assistance provided in selection of faculty project coordinator. Prerequisite: senior standing. Offered: A.

Courses for Graduates Only

CFR 500 Graduate Orientation Seminar (1) Introduction to graduate study. Presentations on College resources and services and current research in each College Division. Division Chairs will share teaching responsibilities. Credit/no credit only. Offered: A.

CFR 590 Graduate Studies (1-5) Study in fields for which there is not sufficient demand to warrant the organization of regular courses. Offered: AWSpS.

CFR 600 Independent Study or Research (*) Offered: AWSpS.

CFR 700 Master's Thesis (*) Offered: AWSpS.

CFR 800 Doctoral Dissertation (*) Offered: AWSpS.

Ecosystem Science and Conservation

Courses for Undergraduates

ESC 101 Introduction to Wildlife Science (1) NW Manuwal Survey of historical development, present status and future of professional field of wildlife science and how it interacts with other disciplines. Natural resource agency speakers discuss how their agencies work and administer wildlife conservation programs.

Students discuss wildlife science with faculty and graduate students. Credit/no credit only. Offered: A.

ESC 200 Trees in Our Environment (5) NW Brubaker Students learn form and function of fifty to sixty tree species as well as the principles and concepts of biology. Students also develop an awareness of trees as integral to the human environment through lectures, laboratory demonstrations, and field studies in the Arboretum. Offered: Sp.

ESC 202 Global Changes and Forest Biology (3/5) NW Hinckley Ecological and biological effects of atmospheric pollutants, acid precipitation, and climate change on forest trees and ecosystems. Potential climate changes are compared to current and historical climates. Students taking this course for five credits must enroll in optional laboratory which introduces major tree species, old-growth forests, small group problem analysis. Offered: W.

ESC 210 Introductory Soils (4) NW Zabowski Physical, chemical, and biological properties that affect distribution and use patterns of this important ecosystem component. Includes soil morphology and genesis, plant nutrition and nutrient cycling, soil water, microbiology, and application of soil properties to environmental concerns. One Saturday field trip. Offered: ASP.

ESC 221 Dendrology and Autecology (6) NW Brubaker, Hinckley Introduction to the systematics, identification, life histories, genetics, and physiological ecology of forest trees and shrubs. Field trips to regional forest ecosystems. Includes one hour of technical writing instruction per week. Offered: A.

ESC 300 Internship in Ecosystem Science and Conservation (3-5, max. 8) Internship experience with a public agency or private company. Preparation of professional report and presentation of oral report. Offered: AWSpS.

ESC 311 Soils and Land Use (3) NW Harrison Intended for students concerned with environmental problems in the Puget Sound basin; also for those who intend to become professionally involved in land-planning decisions. Focus is on the significance of soils in understanding environmental problems and in promoting intelligent land-use decisions. Basic concepts of soil systems are presented, stressing those aspects important in making land-planning decisions. Offered: W.

ESC 320 Natural Resource Issues: Old-Growth and Forest Management (5) I&S/NW Franklin Biological and social elements of current conflicts, especially those associated with old-growth and its disposition. Ecology of Pacific Northwest forests and landscapes, history of forest practices, application of emerging science, proposed alternative practices and policies, including analysis of current proposal and its predecessors and successors. Open to majors and non-majors. Offered: Sp.

ESC 322 Forest Ecosystems (3) NW Agee, Edmonds, Gara Introduction to forest ecosystems, principles of forest ecology, vegetation classification, history of development of Pacific Northwest vegetation, succession, competition, nutrient cycling, ecology and classification of decomposers and insects, use of ecological information in forest management. One Saturday field trip required. Offered: W.

ESC 326 Wildlife Habitat and Silviculture (5) NW Agee Principles of wildlife habitat in forest and range ecosystems. Silvicultural principles applicable to wildlife conservation and management. Includes four weekend field trips across Washington illustrating principles covered in lecture. Prerequisite: 322 and 350 or permission of instructor. Offered: Sp.

ESC 333 Plant Communities: Resilience and Restoration (5) NW Leopold Biological and ecological effects of human impact on native plant communities. Effects of grazing, timber removal, habitat draining and

filling, fire control, and application of chemicals. Potential for ecological restoration of plant communities. Field trips. Prerequisite: 113 and BIOL 102 or BIOL 203 or equivalent. Offered: jointly with BIOL/BOTANY 333; Sp.

ESC 350 Wildlife Biology and Conservation (4) NW *Manuwal* Wildlife ecology and population biology, and interrelationships between wild animals and humans, including encouragement of wildlife population growth and productivity, control of pest populations, and preservation of endangered species with emphasis on forest environments and forest faunas. Open to nonmajors. Prerequisite: junior standing. Offered: W.

ESC 351 Wildlife Research Techniques (3) NW *Manuwal, Raedeke, West* Scientific approaches to the field study of wildlife populations, including basic considerations in experimental design and development of scientific papers. Emphasis on direct experience with current field techniques used in study of vertebrate populations. Prerequisite: junior standing in Wildlife Science. Offered: Sp.

ESC 410 Forest Soils and Site Productivity (5) NW *Harrison* Considers unique properties and processes occurring in forest soils throughout the world with emphasis on soils of Pacific Northwest and aspects of forest soils that affect productivity. Two all-day Saturday field trips and one Saturday-Sunday field trip required. Prerequisites: 210 or one course in soil science or permission of instructor. Offered: A.

ESC 411 Forest Soil Microbiology (4) NW *Edmonds* Soil organisms in forest ecosystems, decomposition, nutrient cycling, N transformation, mycorrhizae, effects of forest management. Prerequisites: general biology, basic soils, or permission of instructor. Offered: even years; A.

ESC 412 Field Survey of Wildland Soils (3) NW *Harrison, Henry, Zabowski* Study of soils in remote sites about which little information is available. Focus is field trip in Cascade Mountains just north of Glacier Peak with prior study of hiking area, soil and ecosystem changes, and wilderness use. Offered: S.

ESC 413 Soil Genesis and Classification (5) NW *Zabowski* Soil formation, morphology, classification, and relationship to the environment. Labs and weekend field trip illustrate properties and processes of forest and grassland soils in Washington. Prerequisites: 210 or permission of instructor. Offered: Sp.

ESC 414 Forest Soil Fertility and Chemistry (3) NW *Harrison* Tree growth depends, in part, on the interaction between chemical and biological activities within a given soil: the biological and chemical parameters that influence the growth; soil solution chemistry and surface reactions; reactions and processes that control essential plant nutrient levels and forms in soil solutions. Prerequisite: 210. Offered: Sp.

ESC 418 The Science of Composting (3) NW *Henry* Introduction to composting as a timely tool for waste management. Designed to give an understanding of the science of composting, an overview of the processes from large-scale composting, an understanding of what acceptable contaminant levels are, and an evaluation of the benefits of compost. Offered: A.

ESC 421 Dendrochronology (4) NW *Brubaker, Peterson* Analysis of important physiological and environmental factors controlling annual tree-ring growth and a critical review of the applications of tree-ring analysis to study forest productivity, watershed hydrology, forest fires, insect epidemics in relation to yearly weather conditions. Laboratory and field exercises construct tree-ring chronologies to study environmental histories of selected forest stands. Prerequisites: introductory botany and senior or graduate standing. Offered: odd years; W.

ESC 432 Forest Pathology (4) NW *Edmonds* Biology impact and control of forest diseases. Abiotic diseases caused by air pollution, adverse weather, and biotic diseases caused by bacteria, fungi, viruses, parasitic plants, and nematodes. Disease management including silvicultural, chemical, and biological control. Disease modeling. Offered: odd years; A.

ESC 440 Theory and Case Studies of Ecosystem Management (5) NW *Franklin* Applying ecological principles in ecosystem management at stand and landscape levels based on observations of problems and practices during a 10-12 day field trip held prior to beginning of quarter. Students observe innovative forest management programs and experiments and prepare written and oral scientific analyses of specific topics. Offered: A.

ESC 441 Landscape Ecology (5) NW *Franklin* Basic landscape ecology concepts, including patches, corridors, networks, spatial dynamics; island biogeographic principles; landscape analysis methods; landscape models. Applications of landscape ecology in resources management (e.g., cumulative effects, cutting, patterns, anadromous fisheries, management of wildlife populations, and open-space planning). Prerequisites: upper-division ecology courses or permission of instructor. Offered: W.

ESC 442 Geographic Information System Applications to Forest Resources (3) NW *VandeCastle* Experience with Geographic Information System (GIS) applications as they relate to forest resource management and ecosystem management including remote sensing, data integration, and modeling. Offered: W.

ESC 450 Wildlife Ecology and Conservation (5) NW *West* Covers advanced principles of wildlife ecology such as habitat selection, population viability, and landscape ecology, and illustrates how they apply to wildlife conservation problems with terrestrial, aquatic, and marine wildlife. Students must share costs of field trips. Prerequisite: 350. Offered: W.

ESC 451 Biology and Conservation of Birds (3) NW *Manuwal* Major principles of natural history, avian reproductive biology, population ecology, and national and international conservation strategies for both hunted and unhunted birds. Emphasis on western United States. Prerequisite: introductory biology. Offered: odd years; A.

ESC 452 Field Ornithology (3) NW *Manuwal* Students learn field identification skills and are introduced to field methodologies through required indoor labs, field trips, and field exercises. Exercises include study of survey techniques, feeding ecology, and behavior. Students are required to share field trip costs. Offered: odd years; A.

ESC 453 Biology and Conservation of Mammals (5) NW *West* Introduction to mammalian evolution, morphology, reproduction, population biology, ecology, and conservation. Lectures address mammals worldwide. Laboratories and fieldwork focus on mammals of Pacific Northwest. Laboratories and two weekend field trips required. Students share travel costs. Prerequisites: 350 or equivalent. Offered: even years; A.

ESC 454 Aquatic Wildlife Ecology (3) NW *VanBlaricom, West, Manuwal, Grue* Conceptual examination of relationships of aquatic wildlife populations (mammals, birds, reptiles, amphibians) to one another and to the aquatic realm. Application of conceptual background to contemporary high-profile issues in aquatic wildlife ecology, conservation, and management. Included is exposure to primary technical literature in the field. Offered: jointly with FISH 454; even years; Sp.

ESC 455 Wildlife Seminar (1, max. 4) NW *Manuwal, West* Discussion of current research and application in wildlife biology and conservation. Credit/no credit only. Prerequisite: 350 or equivalent. Offered: AW.

ESC 459 Wildlife Conservation in Northwest Ecosystems (2) NW *Agee, Manuwal, West* Extended field course offers Wildlife Science students personal interactions with wildlife managers and wildlife populations in strategic public and private lands in the northwestern United States and southern Canada. Students will share costs of trip. Offered when there is sufficient student demand. Prerequisite: junior standing or above. Offered: Sp.

ESC 490, 491, 492 Undergraduate Studies (1-5, 1-5, 1-5) Individual tutorial study of topics for which there is not sufficient demand to warrant the organization of regular classes. Offered: AWSp, AWSp, AWSpS.

ESC 494 Wildlife Senior Project Proposal (3) Selection of research topic, literature review, and preparation of a formal research proposal. Students select a faculty advisor or a faculty committee to assist them in the proposal writing process. Prerequisite: senior standing in wildlife science. Offered: AWSpS.

ESC 495 Senior Project in Conservation of Wildland Resources (5) Individual study of a ecosystem science and conservation problem under direction of a faculty member. Generally taken in last quarter of residence. Offered: AWSpS.

ESC 496 Wildlife Senior Thesis (5) Statistical analysis and presentation of research results and discussion of results of the senior research project. Students work with faculty advisors to complete field or laboratory research and then prepare the senior thesis. Prerequisite: 494. Offered: AWSpS.

Courses for Graduates Only

ESC 501 Forest Ecosystems—Community Ecology (5) *Brubaker* Community ecology of forest ecosystems. Quantitative methods of community description. Role of limiting factors, competition and disturbance in determining community composition, structure and stability. Introduction to forest ecosystem productivity. History and application of successional theory. Prerequisite: basic ecology course or permission of instructor. Offered: A.

ESC 502 Structure and Function of Forest Ecosystems (5) *Peterson* Behavior of forest ecosystems: carbon, nutrient, and hydrologic cycling; factors controlling paths and flow rates of materials; contrasts in ecosystem structure and function among forest types. Offered: Sp.

ESC 506 Graduate Ecosystems Seminar (1) *Halpern* Formal seminar presentations by graduate students in ecosystems and related programs. Information is given on how to give effective seminar presentations and prepare slides. Credit/no credit only.

ESC 507 Soils and Land Use Problems (4) *Harrison* Environmental concerns of soils; how soil properties control potential and reasonable possibilities of land use. Includes factors controlling soil stability, hydrology, fertility, and movement of pollutants. Field trip oriented with weekly activity summaries. Students also conduct field trips to soil-use problem sites. Offered: W.

ESC 509 Review of Forest Autecology (4) *Hinckley* Review of concepts of soil formation, soil fertility, microclimate, hydrology, tree anatomy and morphology, physiology, water relations, mineral nutrition, and genetic and evolutionary mechanisms, as they relate to the adaptation and manipulation of forest-tree populations. For mid-career students only. Offered: A.

ESC 510 Graduate Studies in Forest Soils (1-5) Offered: AWSpS.

ESC 511 Advanced Forest Soil Microbiology (5) *Edmonds* Detailed examination of microbial processes in forest ecosystems; types of organisms, biomass, decomposition and nutrient cycling, microbial transformations of N, impacts of management-clear-cutting, fertilization, pesticide addition. Graduate

project required. Prerequisites: general biology, basic soils or permission of instructor. Offered: even years; A.

ESC 512 Biogeochemical Cycling in Soils and Forest Ecosystems (3) *Zabowski* Elemental cycles in forests and soils. Fundamentals of processes involved in cycling are addressed along with alterations resulting from environment, vegetation, and soil types. Consideration of cycles of nutrients, metals, and other elements. Weekly discussion section reviews literature on biogeochemical cycling. Prerequisites: one soils course or permission of instructor. Offered: W.

ESC 513 Advanced Soil Genesis and Classification (5) *Zabowski* Soil formation, morphology, classification, and relationship to the environment. Labs and field trips illustrate properties and processes of forest and grassland soils in Washington. Requires two weekend field trips and a graduate project. Prerequisites: 210 or permission of instructor. Offered: Sp.

ESC 514 Advanced Forest Soil Fertility and Chemistry (4) *Harrison* Chemical properties of soil, nutrient and toxic elements; supply, retention, and loss of nutrients in soils; utilization of geochemical and ecosystem models such as GEOCHEM, MAGIC, TRICLEDOWN, and ILWAS in developing a quantitative understanding of the chemical function of forest ecosystems. Prerequisites: general chemistry and geology of soils. Offered: Sp.

ESC 515 Advanced Soil and Plant Analysis (3) *Harrison* Plants and animals must acquire nutrient elements from their environment. Quantifying the composition of samples is the first step in understanding the processes in natural and manmade systems. Sampling, handling, preparation, storage, and analysis stressed. Prerequisites: one botany or plant science course, instrumental analysis, soils. Offered: Sp.

ESC 517 Biotransformations of Hazardous Compounds (1) *Strand* Presentation and discussion of the current literature in biotransformation and biological degradation of organic and inorganic compounds, particularly in the microbial environment. Credit/no credit only. Offered: ASP.

ESC 518 Microbial Degradation of Toxic Contaminants (3) *Herwig, Strand* Detailed survey of current understanding of microbiology and degradative pathways of industrial organic compounds, pesticides, plastics, oil, and metals. Microbial requirements for bioremediation. Methods of scientific investigation of microbial transformations. Requires basic understanding of metabolism and organic chemistry. Prerequisite: biological science course. Offered: jointly with CEWA/MICROM 518; Sp.

ESC 520 Graduate Studies in Ecosystem Science (1-5) Offered: AWSpS.

ESC 521 Current Topics in Ecosystem Science (2, max. 6) *Brubaker, Franklin, Hinckley* Consideration of current literature and topics in forest ecosystems and tree physiology. Offered: AWSpS.

ESC 524 Tree Physiology I: Growth and Development (3) *Hinckley* Review of major developmental processes in trees, concentrating on regulatory mechanisms. Role of genetic, hormonal, mechanical, environmental, and ecological mechanisms in regulation of shoot, diameter, root, and reproductive development examined in lecture-discussion format. Seniors in forestry, botany, or related fields may enroll. Offered: W.

ESC 525 Tree Physiology II: Stress (4) *Hinckley* Review of principles and examples of stress physiology, concentrating on processes impacted and mechanisms of resistance. Stress and stress resistance defined and following examples examined: high, low temperature, radiation, anoxia, and pollutants. Prerequisite: 524. Offered: Sp.

ESC 529 Ecosystems Seminar (1) *Sprugel* Discussion by invited speakers on current research related to ecosystems. Credit/no credit only. Offered: A.

ESC 535 Fire Ecology (3) *Agee* Fire regime concept as applied to fire ecology. Methodology for fire history research. History and function of forest fire in western United States with emphasis on Pacific Northwest. One weekend field trip. Prerequisite: permission of instructor. Offered: A.

ESC 538 Graduate Studies in Forest Pathology (1-5) Offered: AWSpS.

ESC 539 Forestry-Fisheries Interactions: Case Studies (3) *Naiman* Case studies of streamside management situation at the watershed and basin level. Topics include resource conflict resolution, current and future management alternatives, landscape dynamics, role of disturbance, and policy options. Prerequisite: graduate standing in forestry, fisheries, or related field; undergraduates by permission of instructor. Offered: jointly with FISH 539; odd years; A.

ESC 547 Stream and River Ecology (5) *Naiman* Characterizations of stream and river ecosystems from a watershed perspective. Emphasis on fundamental processes affecting the structure and dynamics of aquatic communities and the riparian zone. Resource conflicts, new technologies, field trips, and class projects. Recommended: general ecology, forestry-fisheries interactions. Offered: jointly with FISH 547; Sp.

ESC 548 Special Topics in Streamside Studies (2, max. 6) *Naiman* Contemporary problems and issues in forestry, fisheries, and wildlife management in watersheds. Topics vary, yet focus on interactions of land and water resources in the forests of the Pacific Northwest. Prerequisite: permission of instructor. Offered: jointly with FISH 548; AW.

ESC 554 Wildlife Seminar (1-2, max. 10) *Manuwal, West* Discussion of current research and application in wildlife biology and conservation. Prerequisite: permission of instructor. Offered: AW.

ESC 555 Graduate Studies in Wildlife Science (1-5) *Manuwal, Raedeke, West* Offered: AWSpS.

ESC 557 Topics in Wildlife Science (2, max. 6) *West* Graduate seminar on applied and basic topics in wildlife ecology and conservation. Different topics selected each offering. Offered: AWSpS.

ESC 591 Graduate Teaching Practicum (1-5) Principles of teaching and learning applied to undergraduate instruction in Ecosystem Science and Conservation. Development, delivery, and evaluation of lectures and homework assignments. Graduate teaching experience for ESC students only. Credit/no credit only. Offered: AWSpS.

ESC 601 Graduate Internship in Ecosystem Science and Conservation (3-9) Credit/no credit only. Offered: AWSpS.

Forest Engineering

Courses for Undergraduates

F E 300 Timber Harvesting Management (3) *Dowdle* Study of timber harvesting methods and planning procedures. Logging and production costs are covered as well as safety and environmental considerations necessary for harvesting methods and practices. Offered: Sp.

F E 330 Forest Engineering in Society (4) *I&S Greulich, Lee* Forest engineering as a profession in a social, political, and regulatory context including: who engineers work for and what they do; professional ethics and leadership responsibilities; psychological issues in engineering work, state and federal regulatory environment affecting engineering practices; rela-

tionships to employees, special interest groups, and attentive publics. Offered: Sp.

F E 332 Ecological Basis of Forest Engineering (4) *NW Bolton* The recognition and characteristics of forest and wild land organisms in plant and animal kingdoms; their structure, function, development, site requirements, and role within the forest and wild land communities in which they are found. Ecological and biological basis for environmental regulations affecting forest engineering projects and tasks. Offered: A.

F E 340 Plane Surveying (4) *Greulich, Pickford* Surveying theory and practice with emphasis on plane surveying. Proper use of survey instruments including engineer's tape, theodolite, level, and rods to measure and establish angles and distances. Appropriate technique for data recording, reduction and written form presentation, drafting using CADD and COGO packages, and incorporation into GIS. Offered: ASpS.

F E 341 Timber Harvesting (5) *Greulich* Timber harvesting methods and planning procedures. Logging cost and production control. Environmental and safety considerations as related to logging and road construction. Offered: A.

F E 342 Fluid Mechanics (4) *NW Greulich* Fundamentals of fluid mechanics, open- and closed-conduit flow and hydrologic prediction. Analysis and design of drainage ditches and culverts for logging roads. Prerequisites: 10 credits in physics, 8 credits in mathematics. Prerequisite: permission of instructor. Offered: Sp.

F E 345 Forest Surveying and Transportation (5) *NW Schiess* Concepts of timber harvesting requirements, road-access planning, and forest land surveying. Basic road design principles, processes, and practical application of field road location. Basic road drainage design review, overview of road construction techniques and maintenance. A concentrated field experience at Pack Forest for non-forest engineering majors. Offered: Sp.

F E 348 Design of Low Volume Roads (5) *NW Schiess* Theory combined with strong emphasis on field practice. Engineering activities from pre-reconnaissance through construction staking discussed in context of class project involving location, field survey, and design of a forest road. Engineering design theory covered includes horizontal and vertical curves (including spirals), earthwork, minor drainage structures. Prerequisite: 340. Offered: W.

F E 366 Introductory Soil Mechanics (4) *NW Greulich* Soil mechanics background necessary for the design of logging roads and structures. Soil properties and classification, soil hydraulics, soil strength and failure, soil behavior in structural design, soil modification techniques, and slope stability analysis. Application of basic laboratory and field testing procedures. Prerequisites: permission of instructor. Offered: W.

F E 368 Natural Resource Measurements (4) *NW Turnblom* Introduction to principles of measurement, basic field measurement skills, measurement of vegetation, including stand examination, timber cruising, size, weight, volume and biomass of trees, and stream flow. Laboratories include field exercises on sampling techniques for trees and lesser vegetation and linear regression modeling to predict quantities from basic measurements. Offered: W.

F E 404 Forest Engineering Field Seminar (1) Forest engineering activities examined and discussed during three all-day site visits. Opportunity for forest engineering practitioners, faculty, and students to interact in an informal, content-rich environment. Prerequisite: forest engineering student or permission of instructor. Offered: AWSpS.

F E 423 Watershed Analysis (4) *NW Schiess* Inventory and historical analysis of the interactions between natural resources, climate, and forest management. Development of management objectives

and design of forest management activities based on inventory and analysis. Includes the use of modeling and simulation in predicting the influence of forest management activities on other resources. Prerequisite: 425. Offered: W.

F E 425 Wildland Hydrology (4) NW Bolton Introduction to the hydrologic cycle and basic hydrologic methods as applied to wildlands. Effects of forest management activities on hydrologic processes. Offered: W.

F E 427 Hillslope Stability and Land Use (4) I&S/NW Bolton Effects of land management, especially forest land management, on slope stability. Forest harvesting, road construction, and species conversion. Slope stability analyzed on both large (landscape) and small (hillslope) spatial scales. Prerequisites: 425 or equivalent. Offered: even years; Sp.

F E 428 Hillslope Hydrology (4) NW Bolton Runoff processes from hillslopes and small drainage basins. Processes of infiltration, overland flow, and subsurface flow described mathematically. Solutions to resulting differential equations. Prerequisites: 425, MATH 307 or equivalent. Offered: odd years; Sp.

F E 430 Aerial Photos/Remote Sensing Natural Resources (3) NW Schreuder Principles of photogrammetry, interpretation, and remote sensing; and their application to management of natural resources and wildlands. Uses for watersheds, forest resources, wildlife, point and nonpoint pollution, land-use planning, and outdoor recreation. Offered: W.

F E 435 Soil Physics (4) Bolton, Zabowski Physical properties of soil and water. Thermodynamic properties of soil-water mixtures and osmotic effects. Darcy's law and application to the movement of the water table. Horizontal and vertical unsaturated flows: rain infiltration, capillary rise, soil evaporation, water redistribution and hysteresis, heterogeneous soils and instability. Soil-plant-atmosphere continuum: water balance in the root zone; movement through the plant. Prerequisite: integral and differential calculus. Offered: A.

FE 444 Introduction to Forest Engineering Design (4) Fridley, Schiess Design process and methodology; decision making; creativity; project planning and management; engineering economics; probabilistic and statistical aspects of forest engineering design; ethical and legal issues; presentation of design project results. Lecture, laboratory, and design projects. Offered: W.

F E 445 Management Science in Forest Engineering (5) Greulich Management science methods used in data collection, analysis, and decision making examined within a systems framework. Statistical methods of point and interval estimation and regression analysis applied to logging and construction time studies and work sampling. Linear, non-linear, and dynamic programming optimization techniques are applied to forest engineering problems. Offered: W.

F E 450 Advanced Forest Engineering Design (15) Schiess The capstone course for forest engineering majors. Emphasizes the application of forest engineering design principles. State-of-the-art methods and technology are used to craft an implementable natural resources development plan. Enrollment is restricted to forest engineering majors who have completed all other upper-division courses. Offered: Sp.

F E 470 Processing Wood as an Industrial Feedstock (3) Breitsprecher Study of the principles and processes related to processing trees, logs, chips, and other forms of wood in terms of mechanics, chemistry, energy, and the quality of eventual products. Prerequisites: permission of instructor. Offered: W.

F E 480 Silvicultural Engineering Systems (3) Oliver, Fridley Engineering design of systems for establishing, nurturing, and culturing trees for eventual harvest and use as industrial feedstock. Lecture/dis-

cussion. Prerequisites: 368 and ENGR 142, 220, 230, 250. Offered: A.

F E 490, 491, 492 Undergraduate Studies (1-5, 1-5, 1-5) NW Individual tutorial study of topics for which there is not sufficient demand to warrant the organization of regular classes. Offered: AWSp, AWSp, AWSpS.

Courses for Graduates Only

F E 523 Advanced Watershed Analysis (4) Scheiss Inventory and historical analysis of interactions between natural resources, climate, and forest management. Development management objectives and design forest management activities based on inventory and analysis. Use of modeling and simulation for predicting influence of forest management activities on other resources. Site-specific mitigation design and remediation projects. Prerequisite: 425. Offered: W.

F E 524 Watershed Design (4) Fridley, Schiess Study of the principles and processes related to forest engineering design of watershed scale systems. Prerequisites: 523 and graduate standing or permission of instructor. Offered: Sp.

F E 525 Advanced Wildland Hydrology (4) Bolton Advanced treatment of hydrologic cycle and basic hydrologic methods as applied to wildlands. Effects of forest management activities on hydrologic processes. Graduate focus on a detailed field or modeling hydrologic analysis. Offered: W.

F E 527 Advanced Hillslope Stability (4) Bolton Advanced exposure to the effects of land management, especially forest land management, on slope stability. Forest harvesting, road construction, and species conversion. Focus on modeling slope stability in space and time. Offered: even years; Sp.

F E 528 Advanced Hillslope Hydrology (4) Bolton Advanced treatment of runoff processes from hillslopes and small drainage basins. Processes of infiltration, overland flow, and subsurface flow described mathematically. Focus on linking soil water and runoff processes in a computer model. Offered: odd years; Sp.

F E 529 Current Topics in Wildland Hydrology (1) Bolton Students present detailed analysis of research papers on selected topics in wildland hydrology. Topics cover measurement techniques, experimental data, and theoretical models of hydrologic processes. Credit/no credit only. Prerequisites: senior or graduate standing and permission of instructor. Offered: AWSp.

F E 540 Graduate Studies in Forest Engineering (1-5) Offered: AWSpS.

F E 541 Advanced Forest Engineering (5) Fridley, Greulich, Schiess Logging organization and management; logging cost analysis and budgeting. Offered: W.

F E 542 Advanced Logging Engineering (3) Greulich Detailed consideration of problems of logging planning and truck road engineering, including the preparation and field layout of logging plans; location, design, and construction of forest roads. Offered: Sp.

F E 591 Graduate Teaching Practicum (* max. 5) Principles of teaching and learning applied to undergraduate instruction in forest engineering. Development, delivery, and evaluation of actual lectures and homework assignments in the student's area of expertise are required. Credit/no credit only. Prerequisite: permission of instructor. Offered: AWSp.

Forest Management

Courses for Undergraduates

F M 270 Forest Land Use Planning (3) I&S/NW Bradley Introduction to the theory and practice of forest land use planning. Emphasis on the process of developing, implementing, and monitoring multiple-resource land management plans. Discussion of laws and regulations influencing forest land use planning. Selected forest resource planning case studies along the urban to wildland gradient. Two weekend field trips. Offered: W.

F M 300 Professional Forestry Internship (3-5, max. 8) Comprehensive examination of an acceptable experience in professional forestry within a public or private agency, including operational policies and procedures. Preparation of professional assessment report and presentation of seminar based on internship in forest management in broad aspects. Prerequisites: 323, 362, and F E 345. Offered: AWSpS.

F M 323 Silviculture (5) NW Oliver Silviculture techniques, including nursery practices, clear-cutting, seed trees, shelterwood, selection cutting, site preparation, regeneration methods, thinning, fertilization, chemicals, and regional silviculture in the Northeast, Southeast, Midwest, Rocky Mountains, California, Pacific Northwest, and Alaska. Taught at Pack Forest. Multiple-use field trips. Offered: Sp.

F M 324 Forest Protection (5) NW Agee, Edmonds, Gara Effects of fire, diseases, and insects on forest ecosystems, fire ecology and management, abiotic and biotic diseases, disease management, effects of defoliators, bark beetles and wood boring insects, pests of intensive forest management and principles of insect management. Offered: W.

F M 328 Forestry-Fisheries Interactions (4) NW Bolton Characteristics of forestry-fisheries interactions in terrestrial and aquatic landscapes. Effects of changes in landforms on forest and aquatic communities. River basin and watershed features. Forest stand dynamics, forest hydrology, fish and wildlife histories and behavior. Resource conflicts and resolution. Recommended: general biology and ecology. Offered: jointly with FISH 328; even years; W.

F M 360 Forest Management and Economics I (5) I&S/NW Dowdle Basic concepts of production theory, accounting, investment analysis, supply and demand, and their application to the management of forested properties. Prerequisites: ECON 200, Q SCI 292, or equivalent. Offered: W.

F M 362 Field Measurements (5) NW Chappell, Turnblom Basic field measurement skills, interpretation of aerial photos, measurement of vegetation, including stand examination and timber cruising. Concentrated field experience taught at Pack Forest. Prerequisites: Q SCI 381 or equivalent. Offered: Sp.

F M 370 Social Functions of Forest Ecosystems (3) I&S/NW Lee Introduction to structure and function of forest ecosystems; resources as social functions; role of social institutions in modifying ecosystem structure and processes; multi-resource case studies and field trips. Offered: A.

F M 377 Environmental Impact Assessment and Regulation in Forest Resource Management (3) I&S/NW Bradley Current environmental, forest resource, and land-use legislation affecting resource management; origin and evolution of federal, state, and local legislation and their relationship to forest resource planning and management; environmental impact assessment and its relationship to forest practices. Selected case studies of prepared forest land use plans and environmental impact statements. Offered: A.

F M 400 Forestry in Washington (5) Wagar Examines the components of contemporary forestry

practices and issues and their importance to the economy and quality of life in Washington state. For education majors, selected laboratory sessions provide hands-on experience for classrooms K-12 using the Project Learning Tree activity guides. One all-day field trip. Prerequisite: senior or graduate standing. Offered: S.

F M 421 Fundamentals of Business from a Forest Product Perspective (3) I&S/NW *Paun* Introduction to major business disciplines of marketing, finance, human resource management, and management information systems, using examples from the forest products industry. Examination of other business dimensions including international business, social responsibility, and business ethics. Offered: A.

F M 422 Marketing of Forest Products (3) I&S/NW *Eastin, Paun* Introduction to forest products marketing in North America. Examines products marketing, industry structure, and strategic management issues utilizing marketing concepts. Topics include product management, distribution channels, strategic industry analysis, and marketing research techniques. Case studies used to understand forest products industry decision making. Offered: W.

F M 423 International Marketing of Forest Products (3) I&S/NW *Eastin* Introduction to international marketing concepts and their application to forest products. Analysis of forest products trade patterns, resource base changes, policy, industrial policies, and environmental concerns. Discussion of market distorting practices including log export bans and tariff and non-tariff barriers. Offered: Sp.

F M 424 Forest Stand Dynamics (3) NW *Oliver* Forest stand development and manipulation response. Forest stand dynamics and stand structure in pure and mixed species forests, response to minor and major disturbances, interactive changes with time, and patterns and response to manipulation. Prerequisite: previous course work in ecology. Offered: odd years; A.

F M 425 Ecosystem Management (3) NW *Oliver* Advanced concepts and practices in ecosystem management, integrating landscape management principles, inventory, planning, silviculture, objective/tradeoff/policy considerations, stand growth, adaptive management, and systems organization and management. Case study emphasizes integration. Prerequisites: 323 or permission of instructor. Offered: W.

F M 430 Forest Chemicals (3) NW *Gara* Covers all aspects of the use of forest chemicals in forestry: laws, safety, application techniques, and biological effects. Specific chemicals are discussed as to formulations, toxicity, timing, application rates, carriers, and unique safety problems. Prerequisite: junior standing in forest management curriculum or permission of instructor. Offered: W.

F M 435 Forest Entomology (3) NW *Gara* Introduction to general entomology, characteristics, life histories, ecological relations, prevention, and control of forest insects. Offered: W.

F M 436 Laboratory in Forest Entomology (2) NW *Gara* Introduction to the insect orders; identification of forest insects and their damage. One field trip to study insect problems required. Prerequisite: 435, which may be taken concurrently. Offered: A.

F M 481 Forest Management and Economics II (4) I&S/NW *Bare* Basic concepts of timber harvest scheduling, sustained-yield models, contemporary analytical techniques, timber supply, and forest product markets. Prerequisites: 360 or equivalent. Offered: W.

F M 484 Economics of Conservation (3) I&S/NW *Dowdle* Economic principles and their use in the analysis of contemporary conservation problems. Particular emphasis directed toward the conservation of forest resources in the Pacific Northwest and related policy issues. Offered: Sp.

F M 485 Forest Finance and Accounting (3) I&S/NW *Dowdle* Basic concepts of finance and accounting used in forestry. Introduction to principles of bookkeeping and measurement of income. Essentials of cost accounting and taxation. Treatment of property and income taxes and accounting for fixed assets. Use of ratio analysis and financial statements in decision making. Prerequisite: 360. Offered: W.

F M 486 Economics of Timber Production (3) I&S/NW *Dowdle* Application of basic economic concepts to the production of timber as a commercial land use. Analysis of timber investments, alternative management programs, and regulation models. Prerequisite: 360. Offered: even years; A.

F M 488 Forest Measurements (4) NW *Rustagi* Measurement of trees and forest stands; sampling methods for timber, recreation, wildlife and ecological attributes; aerial-photo measurement and interpretation; use of photos in estimation of timber volumes. Prerequisites: Q SCI 381 or equivalent. Offered: A.

F M 489 Forest Biometry (5) NW *Turnblom* Quantitative techniques commonly used in forecasting future forest conditions and developing volume equations: site quality assessment methods, development of site index equations, measurement of stand density and its effects on growth, growth and yield prediction, and familiarization with current computerized forest growth simulation models. Prerequisite: Q SCI 381. Offered: Sp.

F M 470 Forest Policy and Law (5) I&S/NW Analysis of forest policy processes and laws. Stages of policy making/problem solving: law and public policy; natural resource politics; public ownership and management; public policy and private forest land; forest product policies; review of current forest laws and regulations. Includes one hour of writing instruction per week. Offered: A.

F M 481 Management of Wildland Recreation and Amenities (3) NW *Bradley* Introduction and overview of wildland recreation and amenities management. Agency history and objectives explored along with integration of recreation with other land uses. Water, forestry, wildlife, and wilderness resources for recreational uses discussed along with role of private enterprise in recreation and amenities. Topics of current and local interest. Offered: W.

F M 485 Conservation Area Planning and Design (5) NW *Bradley* Integrated consideration of the resource base, social factors, and management objectives in providing conservation, environmental education, open space, and wildland recreation opportunities. Application of contemporary resource planning processes and technology in the development of ecologically-based, multiple resource plans. Case study approach. Prerequisite: permission of instructor. Offered: A.

F M 486 Wilderness Preservation and Management (3) *Wagar* Review of American wilderness philosophies, concepts, and values. Development of the Wilderness Act. Examination of current wilderness-management policies, problems, trends in use, issues and controversies, wilderness research, social costs, and benefits of wilderness. Prerequisite: permission of instructor. Offered: even years; Sp.

F M 490, 491, 492 Undergraduate Studies (1-5, 1-5, 1-5) NW Individual tutorial study of topics for which there is not sufficient demand to warrant the organization of regular classes. Offered: AWSp, AWSp, AWSpS.

F M 495 Senior Project in Forest Management (6) Individual study of a forest management problem under the direction of a faculty member. Students utilize knowledge gained in field studies and required course work to present possible solutions to a specific forest management problem. Prerequisites: 323, 326, and F E 345. Offered: AWSpS.

F M 496 Forest Management Case Studies (5) *Bare, Bradley* Focus on preparation and presentation of management plan for forested area. All aspects of multiple use and ecosystem health considered within multiplicity of economic, biological, legal, social, and political constraints. Case studies to familiarize students with complexities of modern decision making. Prerequisites: 323, 362, and F E 345. Offered: Sp.

Courses for Graduates Only

F M 503 Advanced Forest Stand Dynamics (3) *Oliver* Emphasizes current research and sources of knowledge about forest stand development and responses to manipulations. Development of pure and mixed species forests, even-aged and uneven-aged stands. Responses to disturbances, interactive changes with time, patterns and responses to manipulation: growth and yield quantification. Prerequisite: previous ecology courses. Offered: A.

F M 504 Research Processes in Forest Resources (4) *Lee* Comprehensive survey of research processes for entering graduate students. Diagnostic and prescriptive evaluation of student research capabilities. Problem and hypothesis formulation, study design, multi-method strategies for gathering and analyzing data, and interpretation and presentation of results. Prerequisite: graduate standing. Offered: W.

F M 505 Forest Statistics I (4) *Rustagi, Schreuder, Turnblom* Applications stressed in depth include: growth and yield models, individual tree versus whole-stand models; regeneration survey methods such as stock quadrat and random sampling techniques; concepts of productivity; data collection and analysis techniques used in forest resources management; basic statistics; regression analysis. For mid-career students only. Prerequisite: Q SCI 381 or equivalent. Offered: W.

F M 508 Silvicultural Prescription Preparation (4) *Oliver* Advanced course in silviculture as applied to purposes other than wood production and in the preparation of silvicultural prescriptions. For mid-career students only. Offered: S.

F M 522 Current Topics in Silviculture/Protection (2, max. 6) *Edmonds, Gara, Oliver* Detailed study of current issues, information, and literature in silviculture/protection. Offered: AWSp.

F M 528 International Silviculture (3) *Gara, Oliver* Background of biological, social, and economic basis for silvicultural practices in different areas; case examples of silvicultural practices in different localities; consideration of selected international issues in silviculture. Prerequisite: permission of instructor. Offered: even years; W.

F M 530 Graduate Studies in Forest Fire Control (1-5) Offered: AWSpS.

F M 537 Graduate Studies in Forest Entomology (1-5) Offered: AWSpS.

F M 541 Readings in Silviculture (1-5, max. 6) *Oliver* Detailed study of national and international literature pertaining to silviculture. Offered: AWSpS.

F M 545 Principles of Forest Entomology (3) *Gara* Historical perspective of the discipline, introduction to general entomology and taxonomy, forest insect ecology, integrated pest management concepts for defoliators, bark beetles, wood borers, and urban forestry pests. Prerequisites: general biology, botany, zoology or permission of instructor. Offered: A.

F M 562 Advanced Forest Resources Management (3) *Bare* Overview of concepts and procedures involved in managing forested lands for the production of commodity and amenity values. Use of systems analysis techniques for evaluating alternative land-use programs and manipulations of the forest ecosystem. Prerequisites: graduate standing. Offered: A.

F M 563 Graduate Studies in Forest Mensuration (1-5) Offered: AWSpS.

F M 564 Advanced Forest Biometry (3/5) *Tumblom* Classical problems in analysis of forest populations and growth theory, and principles of parametric analysis and estimation processes in forest biometry. Offered: odd years; W.

F M 565 Graduate Studies in Forest Management (1-5) Offered: AWSpS.

F M 566 Graduate Studies in Forest Photogrammetry (1-5) Offered: AWSpS.

F M 568 Graduate Studies in Forest Economics (1-5) *Bare, Pann, Perez-Garcia, Schreuder* Topical issues including log export controversy, capturing value added products, economics of environmentalism, sustainable forestry, and forest products certification. Offered: AWSpS.

F M 569 Economics of Forest Products Trade (3) *Perez-Garcia* Structure and trends in world forest products trade, trade barriers, trade policies, and methods of modeling and forecasting international forest products markets. Prerequisite: permission of instructor. Offered: Sp.

F M 570 Graduate Studies in Forest Policy Analysis (1-5) Offered: AWSpS.

F M 571 Policy Analysis Design (5) Study based on understanding of the actors, arenas, issues, and policy communities that form the context for policy development and implementation. Exploration of approaches to policy inquiry. Consideration of implications for both policy and management. Students develop a study design for course project. Offered: Sp.

F M 572 Graduate Studies in Forest Resource Planning (1-5) Offered: AWSpS.

F M 573 Forest Environmental Resource Planning (3) *Bradley* Origins and evolution of environmental planning in the forest environment. Discussion of the planning process and methodologies for environmental management and planning; selected case studies of environmental resource plans. Prerequisite: graduate standing. Offered: odd years; A.

F M 574 Seminar in Forest Products Marketing (3) *Eastin, Pann* Evaluate and discuss current research topics in marketing, marketing research, and international marketing of forest products. Presentation of a critical review of published research or administration of an empirical project. Offered: AWSp.

F M 575 Advanced Natural Resources Sociology (3) *Lee* Comparative study of institutional and organizational aspects of natural resources management, with special attention to forest resources. Development, persistence, and change of selected institutions in the context of pre-industrial, industrial, and advanced industrial societies. Implications for policy formulation, decision making, and technology transfer. Offered: even years; A.

F M 576 Current Topics in Forest Policy and Management (1-2) Contemporary problems in forest policy and management. Topics vary but focus on the development of specific political or philosophical issues; empirical questions of concern to the forestry profession; or the development of new tools for management, planning, or policy analysis. Credit/no credit only. Prerequisite: permission of instructor. Offered: AWSp.

F M 577 Forest Resource Economics: Supply (3) *Perez-Garcia* Economic analysis of forest resource and forest products production decisions. Problems of optimal management at stand and forest level. Models of timber supply from public and private lands. Production and supply characteristics of secondary forest products processing. Prerequisites: ECON 400, 401, and permission of instructor. Offered: odd years; Sp.

F M 578 Forest Resource Economics: Demand and Markets (3) *Perez-Garcia* Origin and characteristics of demand for forest products and services including amenities, analysis of markets for products, log and stumpage. Intensive review of current literature. Prerequisites: ECON 400, 401, and permission of instructor. Offered: even years; Sp.

F M 579 Graduate Studies in Forest Sociology (1-5) Offered: AWSpS.

F M 587 Current Topics in International Forest Products Trade: Marketing Research (2, max. 6) *Eastin* Current research topics in marketing, market research, and technology related to the forest products sector. Presented by faculty and invited professionals, supplemented by student presentations. Offered: Sp.

F M 588 Current Topics in International Forest Products Trade (2, max. 6) *Eastin, Pann, Perez-Garcia* Current research topics in a variety of business related areas, including international marketing of forest products, forest economics, international business and global trade modeling. Seminars by faculty and invited professionals supplemented by student presentations. Credit/no credit only. Offered: A.

F M 589 Current Topics in International Forest Products Trade: Forest Economics (2, max. 6) *Perez-Garcia* Current research topics in forest economics as related to forest products sector. Presented by faculty and invited professionals, supplemented by student presentations. Offered: W.

F M 591 Graduate Teaching Practicum (1-5) Principles of teaching and learning applied to undergraduate instruction in Forest Resources Management. Development, delivery, and evaluation of actual lectures and homework assignments are required in the student area of expertise. Credit/no credit only. Offered: AWSp.

F M 601 Graduate Internship in Forest Management (*) Credit/no credit only. Offered: AWSpS.

Paper Science and Engineering

Courses for Undergraduates

PSE 102 Paper, Society, and the Environment (5) *NW McKean* Types of products and patterns of use. Overview of manufacturing processes in terms of raw material, costs, world trade and consumer requirements. Environmental implications of manufacturing, recycling, and disposal of paper and its byproducts. Societal and environmental costs of substituting petroleum-based or nonwood raw materials in paper products. Offered: A.

PSE 200 Wood Products and the Environment (5) *NW Briggs* Designed to provide better understanding of wood as a material. Study of the processes involved in production of major types of wood products, levels of product use, and comparisons of nonwood alternatives. Information and methods designed to aid in understanding complex resource issues. Offered: WSp.

PSE 302 Pulp and Paper Technology (4) *NW Hrutliff, Jacobs* Sources of fiber raw material. Mechanical and chemical pulping and bleaching processes. Conversion of pulp to paper. Laboratory study of raw material, mechanical pulping, and paper making. Offered: A.

PSE 306 Pulp and Paper Processes Analysis (3) *NW Jacobs, McKean* Inorganic chemistry of pulping and bleaching inclusive of sulfur, chlorine, and oxygen-based chemicals, reactivities, and chemical analysis. Wood raw material and conversion to mechanical pulps. Computer-aided material balances on mechanical separation processes. Offered: W.

PSE 309 Creativity and Innovation (2) *VLPA Allan* Understanding creativity and creative thinking;

its challenges and dynamics through knowledge, judgment, planning, and observation. Techniques of creative thinking. Design and development of creative games. Computer-aided creative thinking. Creation, protection, and exploitation of a useful idea, including bargaining and negotiations. Prerequisite: junior standing or permission of instructor. Offered: jointly with CHEM E 309; Sp.

PSE 400 Wood Properties and Utilization (3) I&S/NW Breitsprecher, Briggs Relationship of physical and chemical properties of wood to its use. Role of silviculture and genetics in modifying wood products and value of products. Manufacturing processes of major wood products, examining material and energy balances and environmental effects. Comparison of wood with steel, concrete, plastics, and other materials. Offered: AW.

PSE 401 Wood and Fiber Identification (2) *NW Briggs* Laboratory in identification of wood fibers of North American species. Use of microscope and image analyzer in obtaining wood and fiber measurements. Offered: A.

PSE 402 Paper Properties and Additives (4) *NW Johnson* Material science of paper and paperboard. Measurement and characterization of structural, mechanical, and optical properties of paper. Standard testing methods, paper colorants, effect of additives on paper properties, and relationship of fundamental paper properties to end use requirements. Offered: A.

PSE 403 Fibrous Structure and Rheology I (3) *Allan* Review of the synthetic and natural fibers and their chemical, physical, microscopic, and submicroscopic properties. The bonding behavior of fibers in networks. Analysis of the structure of fiber networks with reference to nonwovens and paper. Offered: A.

PSE 404 Fibrous Structure and Rheology II (3) *Allan* Behavior of fibers in fluid suspensions and properties of webs formed therefrom. Physics and chemistry of fiber-polymer interactions and adhesion. Fiber modification by physical and chemical processes and theory and design of fiber composite materials. Prerequisite: 403. Offered: Sp.

PSE 406 Wood Chemistry I (3) *NW Hrutliff* Chemistry of cellulose, hemicellulose, and lignin. Pulping and bleaching chemistry of wood. Offered: A.

PSE 407 Wood Chemistry I Laboratory (2) *NW Hrutliff* Proximate analysis of wood. Use of instrumental methods for wood component analyses. Offered: W.

PSE 409 Wood Extractives Chemistry (2) *NW Hrutliff* Nature, origin, and occurrence of the extraneous components of wood, their influence on pulp and paper preparation, and their utilization. Offered: odd years; Sp.

PSE 475 Microtechnique (3) *Breitsprecher* Covers the principles and the practice of specimen preparation for light and electron microscopy. Tailored to meet the research interests of the participants. Students prepare mounts by several techniques and examine them with the appropriate instrumentation. Offered: odd years; Sp.

PSE 476 Pulping and Bleaching Processes (3) *Gustafson* Conversion of wood to mechanical and chemical pulps. Kraft, sulfite, and semi-chemical pulping processes. Chemical recovery systems. Bleaching of mechanical and chemical pulps. Offered: jointly with CHEM E 471; W.

PSE 477 Papermaking Processes (3) *Hodgson* Fiber sources and properties. Secondary fibers. Stock preparation, sheet forming, water removal, finishing. Coating, lamination, and printing. Paper products. Offered: jointly with CHEM E 472; W.

PSE 478 Pulp and Paper Laboratory (2) *McKean* Laboratory experiments in chemical and semi-chemical pulping of wood. Bleaching of chemical and high-

yield pulps. Physical and chemical characteristics of pulp fibers. Prerequisite: 476. Offered: jointly with CHEM E 473; Sp.

PSE 479 Pulp and Paper Laboratory II (2) McKean Paper testing, paper additives, flocculation, drainage, retention, heat transfer, and fluid dynamics in papermaking. Sensors and process control. Prerequisite: 477. Offered: Sp.

PSE 480 Pulp and Paper Process Control (3) Gustafson Control of pulp and paper processes. Sensors, actuators, interface equipment, and computer control strategies common to this industry. Prerequisites: 476, 477, or permission of instructor. Offered: Sp.

PSE 481 Pulp and Paper Unit Operation (3) Gustafson Unit operations of particular interest in the pulp and paper industry in addition to those covered in CHEM E 330 and 340. Prerequisite: CHEM E 340. Offered: W.

PSE 482 Pulp and Paper, Process Design and Economics (4) I&S/NW Briggs, Gustafson Analysis of industrial pulping, bleaching, papermaking, recovery, and steam and power operations, using systems analysis approach. Material and energy balances, process economics, process control, and design calculations. Prerequisites: 406, 476, 477, 481, or permission of instructor. Offered: Sp.

PSE 483 Paper Coating and Converting (3) Barlow Coatings and their preparation, rheology, process equipment, drying, and product evaluation. Prerequisite: 477. Offered: W.

PSE 484 Secondary Fiber (3) Hodgson Recycling of paper. Sources of secondary fiber. Processing methods for contaminants and ink removal. Properties and uses of recycled fiber. Prerequisites: 406, 476, 477. Offered: Sp.

PSE 485- Undergraduate Research (1, max. 3) Johnson Undergraduate research or independent study project under the supervision of the faculty; usually one credit per quarter. Prerequisite: senior standing in Pulp and Paper Science. Offered: AWSp.

PSE 488 Polymer Chemistry (3) Allan Fundamental review of synthetic and natural polymers, including kinetics of formation, molecular weight distributions, and solid-state and solution properties. Offered: W.

PSE 490, 491, 492 Undergraduate Studies (1-5, 1-5, 1-5) NW Individual tutorial study of topics for which there is not sufficient demand to warrant the organization of regular classes. Offered: AWSp, AWSp, AWSpS.

PSE 497 Pulp and Paper Internship (1-2, max. 3) Gustafson, Hodgson Technical and economic analysis of commercial pulp and paper installations. Structured visits to industrial operations to observe technical aspects of pulp and paper curriculum in practice. Preparation of visitation reports and analysis in seminar setting. Prerequisites: 406, 476, 477, 481, or permission of instructor. Offered: AS.

Courses for Graduates Only

PSE 508 Advanced Wood Chemistry (3) Hrutford Biogenesis of lignins and isotope labeling methods. Oxidative coupling phenols. Alkaline degradation of polysaccharides and oxygen-based bleaching chemistry. Prerequisite: 406. Offered: odd years; A.

PSE 514 Pulp and Paper Process Simulation (3) Gustafson Presentation of process simulation techniques currently used in the pulp and paper industry. Large-scale simulations of pulp and paper unit operations developed and analyzed. Use of simulations for control, process optimization, and statistical quality control purposes. Offered: even years; A.

PSE 555 Surface and Colloid Science of Papermaking (3) Hodgson Introduction to principles of

surface and colloid science, particularly as they pertain to the wet end of the papermaking process. Surface and colloidal properties of wet end additives. Examination of specific examples and case studies in papermaking situations. Prerequisite: 477 or equivalent. Offered: odd years; A.

PSE 570 Graduate Studies In Forest Products (1-5) Offered: AWSpS.

PSE 572 Wood Chemistry and Analysis (3-5) Hrutford Application of instrumental methods of analysis to wood, wood products, and forest products processing effluents. Emphasis on separation systems, including gas and liquid chromatography, and on spectral analysis. Offered: odd years; W.

PSE 576 Photomicrography of Woody Tissues (3) Breitsprecher Covers the principles of microscopy as well as the techniques of using microscopes and taking photographs with microscopes. Darkroom practice for black and white photography is also included. Students take photographs with several systems, develop negatives, and make enlargements. Offered: Sp.

PSE 577 Wood and Paper Science Seminar (1, max. 6) Discussion of current topics in the science and technology of pulp and paper production, including wood and polymer chemistry. Offered: ASP.

PSE 579 Specifications for Forest Products in World Trade (3) Briggs Compares forest product specifications, standards, testing, and quality procedures between countries and evaluates their role as trade barriers. Examines cultural and trading partners to minimize their impact on trade. Offered: even years; W.

PSE 580 World Woods and Their Utilization (3) Briggs Principal species, forms, and end-uses of wood in world trade. Evaluation of future demands to identify changes in end-use requirements. Examination of technical utilization issues related to plantations, underutilized species, and tropical forests in meeting these uses. Solid wood, panel, fiber, and wood fuel products. Offered: odd years; W.

PSE 589 Wood Biosynthesis (3) Hrutford Biosynthesis of carbohydrates, phenolic and terpenoid compounds in forest trees, and biochemistry of wood degradation. Prerequisite: 406. Offered: even years Sp.

PSE 591 Graduate Teaching Practicum (* max. 5) Principles of teaching and learning applied to undergraduate instruction in paper science and engineering. Development, delivery, and evaluation of actual lectures and homework assignments. Graduate teaching experience for PSE students only. Credit/no credit only. Offered: AWSp.

Urban Horticulture

Courses for Undergraduates

UHF 201 Ecology of Urban Environments (3) I&S/NW Hamilton Biological, chemical, and physical processes and components of urban environments, plus human impacts. Each urban environment, from city cores to naturalized open space, is discussed for above- and below-ground conditions, key plant and animal species, and biological implications of management practices. Offered: A.

UHF 202 Plants in Cities: An Introduction to Urban Horticulture (3) I&S/NW Tukey Introduction to use of plants in cities for the benefit of people who live there, including plant selection, production, design, utilization, maintenance, and management with implications in society, business, environment, and quality of life in urban areas. Offered: W.

UHF 331 Landscape Plant Recognition (3) NW Hamilton, Tsukada Field recognition of important groups of woody and herbaceous landscape plants,

emphasizing diversity at the genus and family levels. Cultivated plant nomenclature. Plant descriptive characters evident in the field with eye and hand lens. Hardiness and landscape applications. Recommended: BOTANY 113. Offered: jointly with BOTANY 331; SpS.

UHF 406 Curatorial Practices In Public Gardens (3) I&S/NW Hamilton, Wolt Techniques of curatorial practice relevant to living collections of plants. Includes developing and using collections policies, collection documentation, plant acquisition, conservation, display methods, exchange programs and procedures, and plant introduction programs. Recommended: three credits in urban horticulture or museology. Offered: Sp.

UHF 411 Plant Propagation: Principles, and Practice (3) NW Wolt Science and practice of plant propagation including sexual (seed) and asexual (cutting, layering, grafting) propagation. Includes discussion of physiological effects, methodology and laboratory exercises. Wide variety of plants covered. Intended for majors in urban horticulture and urban forestry and others interested in reproducing landscape plants. Offered: Sp.

UHF 431 Landscape Plant Selection (5) NW Hamilton Principles of selecting plants for urban landscape sites. Biological basis of plant selection; site analysis of above-ground and soil conditions, including microclimate; assessment of plant performance; plant geography, genetics, exploration, and introduction. Two student projects: study one urban site and analyze one particular plant species. Prerequisite: 331 or equivalent. Offered: A.

UHF 444 Plant Materials in Urban Landscapes (5) NW Laboratory and field course on urban plant materials. Emphasis on cultural requirements, pest and disease susceptibility, and ornamental characteristics of commonly used landscape plants. Introduction to species and cultivars currently available in the nursery trade is integrated with selection and site use in a variety of landscapes. Prerequisite: 331 or equivalent. Offered: Sp.

UHF 445 Landscape Plant Management (5) NW Principles and practices of plant management in cultivated situations. Review of landscape design from the horticultural perspective, management schedules and budgets, arboricultural practices, and care of specialized plant materials. Prerequisite: 331 or equivalent knowledge of woody plants. Offered: A.

UHF 451 Urban Plant Protection (5) NW Edmonds, Gara Working knowledge on insects and diseases of plants growing in the urban environment. Emphasis placed on pest and damage recognition; control methods, and integrated pest management systems. Prerequisites: CHEM 101, 102; BIOL 101, 102 or equivalents. Offered: Sp.

UHF 461 Public Outreach in Urban Horticulture (3) I&S/NW Wolt Aspects of establishing and implementing programs of public urban horticulture outreach (extension) education in university, public institutions, and private contexts. Includes quantitative audience assessment, organization, objective building, lecture and class management, publications, interpretation for diverse audiences, funding, volunteers, and evaluation techniques. Recommended: three credits in urban horticulture. Offered: W.

UHF 470 Urban Forest Landscapes (5) NW Bradley, Wagar, Wolf Comprehensive view of urban forest and urban forest landscapes. Includes close examination of factors that differentiate urban forest landscapes along the urban to wildlife gradient. Compare legal, social, political, administrative, physical, and biological variations. Offered: SpS.

UHF 471 Ecological Concepts and Urban Ecosystems (3) NW Ewing Ecological concepts introduced in an urban context with emphasis on autecological relationships of plants in an urban environment.

General framework for development of urban ecological concepts followed by case studies and exploring applications in new areas. Prerequisite: general ecology, plant physiology, or permission of instructor. Offered: W.

UHF 473 Principles of Ecological Restoration (5)
NW Ewing Philosophy of restoration, structural components of ecosystem degradation, analysis of restoration projects and methods, and an ecosystem by ecosystem review of how systems are restored. An ecology courses that emphasizes applied scientific knowledge of ecosystems. Offered: odd years; A.

UHF 475 Wetland Ecology and Management (5)
NW Ewing, Harrison Wetland types and functions, global and North American distribution, wetland plant types, soil chemistry. The influence of stresses on wetland composition and form. Autecology of wetland plants; response to and detection of stresses. Impacts of urbanization; management techniques. Prerequisites: BOTANY 371; BOTANY 354 or BIOL 472; or permission of instructor. Offered: even years; A.

UHF 490, 491, 492 Undergraduate Studies (1-5, 1-5, 1-5) NW Individual tutorial study of topics for which there is not sufficient demand to warrant the organization of regular classes. Offered: AWSp, AWSp, AWSpS.

UHF 495 Senior Project in Urban Forestry (5) Individual study of an urban forestry problem under direction of a faculty member. Offered: AWSpS.

Courses for Graduates Only

UHF 501 Urban Horticulture Profession (2)
Tukey Describes the emerging profession of urban horticulture and forestry, its history and significance, and the attitudes, knowledge, and skills necessary for success in the profession. Guest lecturers and students discuss and evaluate opportunities. Prerequisites: graduate students in urban horticulture or by permission of instructor. Offered: A.

UHF 502 Data Collection, Analysis, and Presentation (3)
Ewing Design of scientific experiments, collection of data, and use of computers to store, analyze and present data. Limited by equipment availability to 8 students; UH students have priority. Offered: Sp.

UHF 503 Current Issues in Urban Horticulture (1)
 Critical evaluation and discussion of published research in urban horticulture and restoration. Students and faculty present and discuss research methods and questions from current literature. Credit/no credit only. Offered: AWSp.

UHF 531 Seminar in Horticultural Taxonomy and Landscape Plant Selection (1-3, max. 12)
Hamilton Special topics in horticultural taxonomy (nomenclature and systematics of cultivated plants, evolution of diverse genera and families, methods of analysis) and landscape plant selection (natural ecol-

ogy and biogeography of landscape plants, plant exploration, introduction and testing). Recommended: 331 and 431. Offered: W.

UHF 549 Urban Horticulture Seminar (1, max. 6)
Tukey Discussion by invited speakers on current topics in urban horticulture. Credit/no credit only. Offered: A.

UHF 561 Public Presentation in Urban Horticulture (2)
Wolt Students learn to make public presentations in scientific, professional, and popular contexts and to interpret technical information for professional and lay audiences. Support materials, such as audiovisuals and graphics are discussed. Offered: W.

UHF 572 Urban Ecosystem Management Seminar (1-3, max. 9)
Ewing Graduate seminar in urban ecosystem management. Special topics of current importance in urban ecosystem management. Ecological aspects of ecosystem conservation, restoration, and management. Students participate in presentation and discussion of current work. Prerequisites: 471, 475. Offered: W.

UHF 601 Internship in Urban Horticulture (1-9)
 Prerequisite: permission of graduate program adviser. Credit/no credit only. Offered: AWSpS.



Interdisciplinary Graduate Degree Programs

These programs are administered by interdisciplinary groups of the Graduate School. Certain courses carrying the particular program prefix appear below; other courses with the same prefix appear elsewhere as indicated. Other courses included in these programs are selected from many disciplines throughout the University and carry the prefix of the respective discipline.

Biology Teaching

John S. Edwards, Graduate Program Coordinator

The Graduate School Biology Teaching Group offers an interdisciplinary program that leads to the degree of Master of Arts for Teachers in the field of biological science. Designed specifically for biology teachers in secondary schools and community colleges, the program emphasizes broadening the student's understanding of the various fields of biological science, with improvement of the student's effectiveness as a teacher as the primary goal. The program offers opportunities for course work within the departments of the University in biological science and science education. Each student is asked to perform an in-depth study of a biological problem in the context of its relevance to the teaching of biological science. Facilities and guidance are provided by a sponsoring professor and advisory committee drawn from the Biology Teaching Group and the several biological science departments of the University.

Special Requirements

Prospective candidates for the degree must have an initial or continuing certificate for teaching biology at the secondary level.

Assistantships and fellowships are not provided under the aegis of this program.

Correspondence and Information

Graduate Program Coordinator
Biology Teaching, Box 355320

Faculty

Chair

John S. Edwards

Professors

Ammirati, Joseph F. * 1979; MA, 1967, San Francisco State; PhD, 1972, University of Michigan; mycology, taxonomy and ecology of fungi.

Deyrup-Olsen, Ingrid J. * 1964, (Emeritus); PhD, 1944, Columbia University; general physiology, cell-membrane phenomena.

Edwards, John S. * 1967; PhD, 1960, Cambridge University (UK); arthropod neurobiology, insect physiology and development, tundra and alpine biology.

Hille, Merrill B. * 1976; PhD, 1965, Rockefeller University; developmental biology, gastrulation in sea urchin embryos, translational regulation during meiosis.

Kohn, Alan J. * 1961; PhD, 1957, Yale University; invertebrate zoology, ecology and functional morphology of marine invertebrates.

Laird, Charles D. * 1971; PhD, 1966, Stanford University; cell and developmental biology, human genetics.

Leopold, Estella B. * 1976; PhD, 1955, Yale University; paleoecology, pollen and seed analysis, late Cenozoic environment.

Nester, Eugene W. * 1962; PhD, 1959, Case Western Reserve University; genetics and biochemistry of bacterial-plant cell interactions, tumorigenesis.

Olstad, Roger G. * 1964, (Emeritus); PhD, 1963, University of Minnesota; science education, teacher education.

Stettler, Reinhard F. * 1963, (Emeritus); PhD, 1963, University of California (Berkeley); genetics of forest tree populations, biotechnology, biomass production.

Whisler, Howard C. * 1963; PhD, 1961, University of California (Berkeley); mycology, aquatic fungi, slime-molds and phycocyanes, development.

Associate Professor

Van Volkenburgh, Elizabeth * 1987; PhD, 1980, University of Washington; leaf growth and development, photobiology and electrophysiology.

Global Trade, Transportation, and Logistics Studies

2 Smith

The aim of the graduate option program in Global Trade, Transportation, and Logistics (GTTL), is to enable graduate students to augment their degree programs in preparation for careers that demand the combined knowledge of trade, transportation, and logistics. Particular attention is directed to activities involved in the flow of goods from point of origin to point of consumption across international boundaries. These activities involve maritime, aviation, overland modes of transport, and the intermodal connections among them, as well as logistics management. The full range of activities also includes telecommunications, information, technological, environmental, energy, regulatory, and other systems that facilitate the negotiation and implementation of international trade and transportation.

The GTTL option is wide-ranging and is tied to the needs of government and industry for people trained in the methods of today's global commerce. The program is overseen by an Interdisciplinary Committee on Global Trade, Transportation, and Logistics whose members come from the University, the private sector, and the public sector. GTTL works with leaders in business and government organizations to develop internships and jobs for graduate students in the option program. The GTTL option is based on a set of course requirements to be fulfilled in conjunction with the student's existing graduate degree program.

Interdisciplinary Committee

The Interdisciplinary Committee oversees the core courses and recommends instructors, maintains the list of eligible electives, and coordinates with course instructors regarding scheduling and prerequisites. It periodically reviews core courses and promotes internships and placement. The committee is assisted in these tasks by the lead core course instructor, the program director, and the Graduate School staff, as appropriate. The committee is responsible for policy on admission to the option program. This is tailored to the

desired enrollment in the core courses, employment opportunities, and other factors. Currently the option is open to all eligible students. Advising is the primary responsibility of the student's departmental representative on the committee.

Graduate Program

Students associated with GTTL obtain their degrees through cooperating academic units. Students admitted into graduate degree programs in the following units are eligible for the GTTL option with concurrence of their faculty adviser: Aeronautics and Astronautics, Business Administration, Civil Engineering, Communications, Economics, Education, Forest Resources, Geography, International Studies, Law, Marine Affairs, Political Science, Public Affairs, Technical Communications. GTTL prepares students for careers in international trade, transportation, and logistics by offering a comprehensive program encompassing selected courses from heretofore separate disciplines. Those students completing the option receive an appropriate notation on their transcript. In addition, a Letter of Achievement is given, signed by the head of the student's academic unit and the Dean of the Graduate School.

Option Requirements

The option consists of a minimum of 18 credits: two core courses (6 credits) and four elective courses (at least 12 credits).

The core courses provide a basic overview of the academic theories, political economic structures, industrial dynamics, public policies, and strategic issues concerning the study, business, and/or regulation of global trade, transportation, and logistics.

The Core-I course, GTTL 501 (3 credits) is a lecture/discussion and provides an overview of the concepts and substance of trade, transportation, and logistics. It introduces the interdisciplinary dynamics and the relevant literature, and orients students toward appropriate elective courses.

The Core-II course, GTTL 502 (3 credits) is an interdisciplinary seminar involving two or more faculty from the GTTL Committee and is designed to build a bridge between practitioners and researchers who are at the forefront of trade, transportation, and logistics. The seminar is topical—selecting a specific issue or problem for emphasis.

Students select electives from a continually updated list prepared by a curriculum committee. Most electives (and core courses) may also satisfy a student's home department requirements. At least one elective must come from outside the home department to reinforce the interdisciplinary aspects of the option. A substitution policy developed by the committee assures that an appropriate mix of electives can be found for each student.

Correspondence and Information

Jess Browning, Director
Global Trade, Transportation, and Logistics Studies,
Box 353585
616-5778; FAX 616-5736
email: gttl@u.washington.edu

Faculty

Chair

Marc Hershman

Professors

Beyers, William B. * 1962; PhD, 1967, University of Washington; economic geography, regional analysis, regional development.

Decher, Reiner * 1967; PhD, 1968, Massachusetts Institute of Technology; aircraft propulsion, fluid mechanics, energy conversion.

Haselkorn, Mark P. * 1985; PhD, 1977, University of Michigan; real-time information systems, human/machine interaction, the computer in technical communication.

Hershman, Marc * 1976; JD, 1967, Temple University; LL.M., 1970, University of Miami (Florida); coastal zone management law.

Mahoney, Joseph P. * 1978; PhD, 1979, Texas A&M University; construction materials, pavement systems.

Nihan, Nancy L. * 1973; PhD, 1970, Northwestern University; transportation planning and systems analysis.

Olson, David J. * 1974; PhD, 1971, University of Wisconsin; American government and politics (urban, state, and labor relations).

Rutherford, G. Scott * 1981; PhD, 1974, Northwestern University; transportation planning and engineering.

Associate Professors

Schmitt, Thomas G. * 1979; DBA, 1979, Indiana University; management of service and manufacturing operations.

Wong, Kar-Yiu * 1983; PhD, 1983, Columbia University; international trade and commercial policy.

Health Services Administration

Mary Richardson, Graduate Program Coordinator

The Health Services Administration Group offers a two-year program of studies leading to the degree of Master of Health Administration. It provides preparation for careers in management, planning, and policy analysis in ambulatory-care organizations, hospitals, long-term-care facilities, mental-health-care organizations, government agencies, planning agencies, and other organizational settings in the health field. The curriculum is designed to be interdisciplinary with a faculty drawn from the School of Public Health and Community Medicine, and from the Graduate Schools of Business Administration and Public Affairs. A student's program of studies may vary according to his or her concentration of study and career objectives. In addition to academic work, students are required to participate in an internship experience in a health facility or agency under the preceptorship of the administrator or director of that organization.

A concurrent degree program combining the M.H.A. and M.B.A. degrees also is offered. This curriculum requires three years of intensive academic study and culminates in a joint M.H.A.-M.B.A. degree.

Course listings may be found under the School of Public Health and Community Medicine, Department of Health Services.

Special Requirements

Applicants must submit, in addition to Graduate School admission requirements, at least three letters of recommendation and scores from the Graduate Record Examination. A narrative statement of objectives is also required, and interviews by members of the program faculty may be required. Relevant health field experience is preferred. Applicants are accepted only for autumn quarter of each year. The application deadline is February 15.

Financial Aid

The M.H.A. Alumni Association sponsors a fund-raising phonathon from which some of the proceeds go toward program scholarships. The Foster G. McGaw

Scholarship, administered by the Association of University Programs in Health Administration, may be awarded. A scholarship sponsored by the Association of Medical Group Administrators is available for students concentrating in ambulatory care management. Group Health Cooperative of Puget Sound sponsors a Graduate Research Association position for an underrepresented minority student (particularly Black, Hispanic, or Native American). Health Education Assistance Loans (HEAL) monies are also available to graduate students in health services. However, students admitted should be prepared to utilize their own resources to finance their graduate education.

Research Facilities

In addition to utilizing University facilities, the program makes extensive use of community health facilities and agencies for research and training.

Correspondence and Information

Graduate Program Coordinator
H660 Health Sciences, Box 357660

Faculty

Director

Mary L. Richardson

Professors

Conrad, Douglas A. * 1977; MHA, 1973, University of Washington; MBA, 1977, PhD, 1978, University of Chicago.

Klasterin, Theodore * 1974; PhD, 1973, University of Texas (Austin); operations management, facility location, project management, waiting lines, logistics, inventory.

Madden, Carolyn Watts * 1975; MA, 1974, PhD, 1976, Johns Hopkins University; health economics and policy.

Perrin, Edward * 1975; MA, 1956, Columbia University; PhD, 1961, Stanford University; health information services, research methodology.

Ross, Austin Jr. 1977; MPH, 1955, University of California (Berkeley); ambulatory care, health care delivery systems.

Associate Professors

Grembowski, David * 1981; MA, 1975, Washington State University; PhD, 1982, University of Washington; dental care demand, fluoridation, dental health services research.

Martin, Diane P. * 1973; MA, 1972, Temple University; PhD, 1979, University of Washington; health services use and cost, alternative delivery systems and insurance.

Richardson, Mary L. * 1978; MHA, 1978, PhD, 1984, University of Washington; organization, management, and analysis of policy relevant to health services.

Wickizer, Thomas M. * 1988; MSW, 1974, University of Washington; MPH, 1979, MA, 1987, PhD, 1989, University of Michigan; health promotion evaluation.

Molecular and Cellular Biology

Graduate Program

The Molecular and Cellular Biology Program (MCB) is a leader in applying the technologies used in molecular and cellular biology to advance the understanding of basic biological sciences. Thirteen departments

across three schools have faculty members actively pursuing research in molecular and cellular biology. The departments participating in the program include Biochemistry, Bioengineering, Biological Structure, Botany, Environmental Health, Genetics, Immunology, Microbiology, Pathobiology, Pathology, Pharmacology, Physiology & Biophysics, and Zoology.

At the Fred Hutchinson Cancer Research Center (FHCRC) the divisions of Basic Sciences and Molecular Medicine are the Center's participating units in the joint Molecular and Cellular Biology graduate program. Shared FHCRC facilities are available for electron microscopy, flow cytometry, tissue culture and image analysis. A biotechnology center for DNA and protein synthesis and sequencing, animal facilities, a biological production facility that focuses on monoclonal antibody production, extensive libraries, and a biocomputing center provide further support for the research effort.

Faculty Interests

Nearly 150 faculty members from the UW and the FHCRC are researching molecular and cellular biology and are skilled in the training of graduate students. Faculty research interests encompass both prokaryotic and eukaryotic cells in the following general areas: regulation of gene expression/growth factors/hormones; molecular genetics/gene structure/gene families; microbiology/microbial genetics; DNA replication/mutagenesis/repair and recombination; developmental biology/developmental genetics/cell differentiation; virus/retroviruses; immunobiology; cell division/cell proliferation/cell cycle; cell motility/cytoskeleton/biomechanics; neurobiology; cell matrix interactions/extracellular matrix; molecular structure.

Admission

The Molecular and Cellular Biology Program is a nationally competitive program which receives applications from many outstanding students. Applicants may apply both to the MCB Program and to any of the 13 participating UW departments. Since application requirements or deadlines may differ, applicants should contact the participating departments for information.

In addition to the Graduate School application requirements, prospective students must submit an MCB Program application form, a personal statement of research interests and career goals, three letters of recommendation, and Graduate Record Examination scores with a Subject Test.

Financial Aid

The MCB Program provides a stipend plus tuition for the first year of study. At the end of the first year of study, students choose a Doctoral Committee, and subsequent years of support are provided by the department of the committee chair. Students displaying satisfactory academic progress receive funding for the duration of their graduate training.

Ph.D. Requirements

The Program, which culminates in the Ph.D. degree, includes training in laboratory research, teaching, presentation of lectures or seminars, basic curriculum offerings in molecular and cellular biology and graduate level electives in the student's area of interest. The required courses for the first year include a three-quarter general graduate lecture course in molecular and cellular biology and a three-quarter literature review course. Selection from a large list of elective courses is based on the student's background and interests.

During the first year students participate in research rotations in three laboratories. The purpose of these rotations is to learn basic research techniques and to become familiar with the various research areas in molecular and cellular biology of participating faculty members.

At the end of the second year or early in the third year, students take the General Examination. Formal course work is usually completed by this time, although students may take elective courses of interest. Students continue to participate in various department seminar courses and journal clubs.

Beyond the second year students work full-time on the dissertation research project. The final requirements for the Ph.D. degree include a written dissertation and an oral dissertation defense.

MCB Program students participate in a monthly seminar program which involves student and faculty presentations. The purpose of these seminars is to acquaint students with the research carried on in many laboratories involved in the Program and to give students practical experience in giving presentations before their peers. In addition, MCB Program students are invited to seminar programs in the participating departments and the Fred Hutchinson Cancer Research Center.

Correspondence and Information

Program Specialist
Molecular and Cellular Biology Program, Box 355330
University of Washington
Seattle, WA 98195-5330

Faculty

Professors

Baskin, Denis G. * 1979, (Research); PhD, 1969, University of California (Berkeley); histology, cytochemistry, neuroendocrinology.

Bassingthwaite, James * 1975; MD, 1955, University of Toronto (Canada); PhD, 1964, Mayo Medical School; computer analysis of transport mechanisms in blood and tissues.

Beavo, Joseph A. * 1977; PhD, 1970, Vanderbilt University; roles and molecular mechanisms of cyclic nucleotide phosphodiesterase regulation of cell function.

Bendich, Arnold J. * 1970; PhD, 1969, University of Washington; mitochondrial and chloroplast genome structure.

Berger, Albert J. * 1978; MA, 1965, PhD, 1967, Princeton University; PhD, 1976, University of California (San Francisco); neural and chemical control of respiration.

Bevan, Michael J. * 1990; PhD, 1972, National Institute for Medical Research (UK); T lymphocyte development and specificity.

Bornstein, Paul * 1967; MD, 1958, New York University; extracellular matrix.

Bothwell, Mark A. 1985; PhD, 1975, University of California (Berkeley); molecular and cellular physiology of nerve growth factors.

Bowen-Pope, Daniel * 1979; PhD, 1979, University of California (Berkeley); gene regulation, growth factors and receptors.

Byers, Breck E. * 1970; PhD, 1967, Harvard University; cell biology: mitosis and meiosis, mechanisms of nuclear division and crossing-over in yeast.

Byers, Peter H. * 1976; MD, 1969, Case Western Reserve University; extracellular matrix synthesis, genetic disorders of collagen metabolism, secretion.

Carter, William G. * 1981; PhD, 1974, University of California (Davis); elucidation of components in cell attachment and cell spreading in normal cells.

Catterall, William A. * 1977; PhD, 1972, Johns Hopkins University; molecular biology of ion channels, molecular pharmacology and neurobiology.

Cattolico, Rose A. * 1975; PhD, 1973, State University of New York (Stony Brook); plasmid replication, nucleic acid biochemistry in synchronized unicellular algae.

Champoux, James J. * 1972; PhD, 1970, Stanford University; DNA replication, tumor virology.

Clark, Edward A. * 1984; PhD, 1977, University of California (Los Angeles); lymphocyte surface molecules, lymphocyte activation and cell communication.

Clark, John I. 1982; PhD, 1974, University of Washington; structural and developmental basis of lens-cell transparency and cataract formation.

Cleland, Robert E. * 1964; PhD, 1957, California Institute of Technology; physiology, plant hormones, cell wall.

Collins, Steven J. 1980; MD, 1973, Columbia University; oncology.

Costa, Lucio Guido * 1983; PharmD, 1977, University of Milan (Italy); neurotoxicology; developmental and molecular mechanisms/biological markers of neurotoxicity.

Crill, Wayne E. * 1967; MD, 1962, University of Washington; properties of cortical neurons.

Dale-Crunk, Beverly A. * 1972; PhD, 1968, University of Michigan; keratin biochemistry.

Davie, Earl Warren * 1962; PhD, 1954, University of Washington; protein synthesis, mechanism of blood clotting, cloning of plasma proteins.

Detwiler, Peter B. * 1977; PhD, 1970, Georgetown University; physiology of photoreceptors.

Disteche, Christine M. * 1980; PhD, 1976, University of Liege (Belgium); molecular genetics of sex chromosomes, X inactivation, human and mouse cytogenetics.

Dorsa, Daniel M. * 1981; PhD, 1977, University of California (Davis); neuropharmacology, neurochemistry.

Eisen, Harvey * 1986; PhD, 1967, University of Toronto (Canada); host-parasite interactions, generation of genetic diversity.

Eisenman, Robert M. * 1982; PhD, 1971, University of Chicago; viral oncology, oncogenes, retrovirus multiplication.

Eyre, David R. * 1985; PhD, 1969, University of Leeds (UK); connective tissue biology, collagen chemistry, bone and cartilage metabolism.

Fangman, Walton L. * 1967; PhD, 1965, Purdue University; molecular genetics: control of replication of yeast chromosomes, plasmid and mitochondrial DNA.

Faustman, Elaine M. * 1983; PhD, 1980, Michigan State University; developmental toxicology, risk assessment methodologies, toxicology of N-nitroso compounds.

Fausto, Nelson 1994; MD, 1960, Sao Paulo State University (Brazil).

Fields, Stanley 1995; MA, 1978, PhD, 1981, Cambridge University (UK); molecular genetics.

Floss, Heinz G. * 1987; PhD, 1961, Technical University of Munich (Germany); bioorganic and natural products chemistry.

Furlong, Clement E. * 1977, (Research); PhD, 1968, University of California (Davis); human biochemical genetics in biochemistry of membrane transport systems.

Gallant, Jonathan A. * 1961; PhD, 1961, Johns Hopkins University; molecular genetics, control mechanisms in bacteria, accuracy of translation.

Galloway, Denise A. * 1982, (Research); PhD, 1976, City University of New York; viral pathogenesis and neoplasia.

Gelb, Michael H. * 1985; PhD, 1982, Yale University; mechanistic enzymology, bioorganic and medicinal chemistry.

Glomset, John A. * 1960; MD, 1960, University of Uppsala (Sweden); membrane structure and function.

Gordon, Albert M. * 1964; PhD, 1961, Cornell University; skeletal muscle physiology.

Gordon, Milton * 1959; PhD, 1953, University of Illinois; molecular basis of plant tumors, control of gene expression in plants.

Greenberg, Philip D. * 1978; MD, 1971, State University of New York (Downstate); molecular, cellular, viral, and tumor immunology.

Groudine, Mark * 1982; MD, 1975, PhD, 1976, University of Pennsylvania; chromatin structure and gene activity in development and transformation.

Hakomori, Sen-Itiroh * 1967; MD, 1951, DMedSc, 1956, Tohoku Imperial University (Japan); role of glycosphingolipids in defining antigenicity, cellular interaction.

Hall, Benjamin D. * 1963; MA, 1956, PhD, 1959, Harvard University; molecular genetics and evolution of plants and lower eukaryotes.

Hartwell, Leland H. * 1968; PhD, 1964, Massachusetts Institute of Technology; genetic analysis of chromosome transmission and of the control of division by hormones in yeast.

Hauschka, Stephen D. * 1972; PhD, 1966, Johns Hopkins University; muscle differentiation.

Hendrickson, Anita E. * 1969; PhD, 1964, University of Washington; neuroanatomy, morphology and development of primate retina.

Hille, Bertil * 1968; PhD, 1967, Rockefeller University; ion channels of excitable membranes.

Hille, Merrill B. * 1976; PhD, 1965, Rockefeller University; developmental biology, gastrulation in sea urchin embryos, translational regulation during meiosis.

Hol, Wilhelmus G. J. * 1992; PhD, 1971, University of Groningen (Netherlands); protein crystallography, drug design, vaccine development, and protein engineering.

Hood, Leroy E. * 1992; PhD, 1968, California Institute of Technology; molecular immunology, large-scale DNA mapping and sequencing, molecular evolution.

Hurley, James Bryant * 1985; PhD, 1979, University of Illinois; molecular basis of vision.

Katze, Michael Gerald * 1987; PhD, 1980, Hahnemann Medical College; regulation of viral gene expression at the translational level.

Kenny, George E. * 1961; PhD, 1961, University of Minnesota; human immune response to infectious diseases, detection and biology of mycoplasmas.

King, Mary-Claire 1995; PhD, 1973, University of California (Berkeley); human genetics.

Krebs, Edwin G. * 1977, (Emeritus); MD, 1943, Washington University; intracellular signaling mechanisms involving protein phosphorylation.

Kushmerick, Martin J. * 1988; MD, 1963, PhD, 1966, University of Pennsylvania; muscle contraction, magnetic resonance, metabolic imaging NMR spectroscopy.

Laird, Charles D. * 1971; PhD, 1966, Stanford University; cell and developmental biology, human genetics.

Linial, Maxine L. * 1982, (Research); PhD, 1970, Tufts University; retroviral replication and genetics, retroviral transformation.

Loeb, Lawrence A. * 1978; MD, 1961, New York University; PhD, 1967, University of California (Berkeley); DNA replication, cancer and AIDS.

Lory, Stephen * 1984; PhD, 1980, University of California (Los Angeles); biochemistry, genetics of microbial virulence factors.

Lucht, Daniel L. * 1973; PhD, 1969, University of Washington; electron microscopy and cell biology, lung anatomy/pathophysiology, fiber toxicology.

- Martin, George * 1957; MD, 1953, University of Washington; somatic cell genetics, pathobiology of aging, Alzheimer's disease, Werner's syndrome.
- McDougall, James K. * 1982; PhD, 1971, University of Birmingham (UK); cell cycle, genetic instability and neoplasia.
- McKnight, G. Stanley * 1979; PhD, 1976, Stanford University; phosphorylation; gene expression and neuro/endocrine physiology in mice using genetic approaches.
- Miller, Arthur D. * 1987; PhD, 1982, Stanford University; retrovirus biology, gene transfer, gene therapy.
- Moody, William J. * 1982; PhD, 1977, Stanford University; single cell electrophysiology, development of electrical properties in embryos.
- Morris, David R. * 1966; PhD, 1964, University of Illinois; regulatory genes.
- Mullins, James I. 1994; PhD, 1978, University of Minnesota; cell biology and biochemistry.
- Narayanan, A. Sampath * 1971, (Research); PhD, 1967, University of Madras (India); connective tissue, periodontal disease, regulation of fibroblast growth, matrix synthesis.
- Nathanson, Neil M. * 1979; PhD, 1975, Brandeis University; molecular analysis of neural signal transduction by muscarinic neurokinin receptors.
- Neiman, Paul E. * 1971; MD, 1964, University of Washington; oncology.
- Nester, Eugene W. * 1962; PhD, 1959, Case Western Reserve University; genetics and biochemistry of bacterial-plant cell interactions, tumorigenesis.
- Norwood, Thomas H. * 1973; MD, 1968, University of Maryland; somatic cell genetics, pathobiology of aging, mitotic cell cycle regulation.
- Odell, Garrett M. * 1985; PhD, 1972, Johns Hopkins University; mathematical biology, ecology, models in cell and developmental biology.
- Omicinski, Curtis J. * 1983; PhD, 1980, University of Washington; molecular toxicology, genetic regulation/expression of drug/chemical metabolizing enzymes.
- Palmiter, Richard D. * 1982; PhD, 1968, Stanford University; regulation of gene expression in transgenic mice.
- Parson, William W. * 1971; PhD, 1965, Case Western Reserve University; bioenergetics, with particular emphasis on photosynthesis, picosecond spectroscopy.
- Perlmutter, Roger M. * 1984; MD, 1979, PhD, 1979, Washington University; molecular immunology and signal transduction in hematopoietic cells.
- Petra, Philip H. * 1966; PhD, 1966, Tulane University; reproductive biochemistry.
- Pious, Donald A. * 1964; MD, 1956, University of Pennsylvania; antigen processing, function of nonclassical MHC genes, MHC gene regulation.
- Rabinovitch, Peter S. * 1980; MD, 1979, PhD, 1980, University of Washington; cellular aging, preneoplastic disease, cell cycle abnormalities, DNA change.
- Ratner, Buddy D. * 1972; PhD, 1972, Polytechnic Institute of Brooklyn; synthesis and characterization of polymeric biomaterials.
- Reeder, Ronald H. * 1981; PhD, 1965, Massachusetts Institute of Technology; regulation of ribosomal RNA transcription by RNA polymerase I.
- Reh, Thomas A. * 1989; PhD, 1981, University of Wisconsin; regeneration and development of central nervous system.
- Reid, Brian R. * 1980; PhD, 1965, University of California (Berkeley); biophysical chemistry.
- Riddiford, Lynn M. * 1973; PhD, 1961, Cornell University; insect development and physiology, invertebrate endocrinology.
- Roberts, Marilyn C. * 1981; PhD, 1978, University of Washington; mycobacterium, antibiotic resistance genes, plasmids and sexually transmitted diseases.
- Rohrschneider, Larry R. * 1982; PhD, 1973, University of Wisconsin; control of growth, differentiation, transformation by the c-fms proto-oncogene.
- Ross, Russell * 1962; DDS, 1955, Columbia University; PhD, 1962, University of Washington; atherosclerosis, growth factors, inflammation, vascular biology.
- Saari, John C. * 1974; PhD, 1970, University of Washington; retinal biochemistry.
- Sage, E. Helene * 1980; PhD, 1977, University of Utah; molecular and cell biology.
- Sandell, Linda J. * 1987; PhD, 1980, Northwestern University; biochemistry and molecular biology of connective tissue, extracellular matrix molecules.
- Schubiger, Gerold A. * 1972; PhD, 1968, University of Zurich (Switzerland); developmental genetic control of *Drosophila* embryos, pattern formation in imaginal disks.
- Schwartz, Stephen Mark * 1974; MD, 1967, Boston University; PhD, 1973, University of Washington; vascular biology, atherosclerosis, molecular basis of lineage, developmental biology, cell kinetics.
- Schwindt, Peter C. * 1974; PhD, 1972, University of Washington; properties of spinal and cortical neurons, mechanisms of repetitive firing and convulsive activity.
- Sibley, Carol Hopkins * 1976; PhD, 1974, University of California (San Francisco); mammalian cell genetics and molecular parasitology.
- Smith, Gerald R. * 1983; PhD, 1970, Massachusetts Institute of Technology; molecular biology of genetic recombination and regulation of gene expression.
- Stahl, William L. * 1967; PhD, 1963, University of Pittsburgh; neurochemistry of brain ATPase systems.
- Staley, James T. * 1971; PhD, 1967, University of California (Davis); microbial ecology, bacterial systematics, general microbiology.
- Stamatoyannopoulos, George 1965; MD, 1958, DMedSc, 1960, University of Athens (Greece); medical genetics.
- Steiner, Robert A. * 1977; PhD, 1975, University of Oregon; neuroendocrinology.
- Storm, Daniel R. * 1978; PhD, 1971, University of California (Berkeley); molecular basis of neuroplasticity; cAMP and Ca²⁺ signal transduction systems in the CNS.
- Stuart, Kenneth Daniel * 1985; PhD, 1969, University of Iowa; molecular biology of parasites.
- Teller, David C. * 1965; PhD, 1964, University of California (Berkeley); physical chemistry of macromolecules, association reactions of proteins.
- Todaro, George J. * 1983; MD, 1963, New York University; growth regulation in normal/tumor cells, growth factors and their receptors, novel cell therapies.
- Truman, James W. * 1973; PhD, 1970, Harvard University; hormones and invertebrate behavior, insect physiology, circadian rhythms.
- Verdugo, Pedro * 1974; MD, 1965, State University of Chile; microrheology, biomechanics, polymer gel physics, laser spectroscopy, cell biology.
- Walsh, Kenneth A. * 1958; PhD, 1959, University of Toronto (Canada); structure and functions of proteins; phosphatases, mass spectrometry.
- Wight, Thomas * 1978; PhD, 1972, University of New Hampshire; connective tissue biology and pathology, proteoglycans metabolism, atherosclerosis.
- Willows, A. O. Dennis * 1969; PhD, 1967, University of Oregon; invertebrate neurophysiology, neural mechanisms underlying behavior.
- Wilson, Christopher B. * 1980; MD, 1972, University of California (Los Angeles); immunology, rheumatology, infectious diseases.
- Wingfield, John C. * 1985; PhD, 1973, University College of North Wales (UK); environmental and hormonal control of avian reproductive cycles.
- Wolf, Norman S. * 1968; DVM, 1953, Kansas State University; PhD, 1960, Northwestern University; hematopoietic stem cell dynamics and transplantation, aging at the cellular level.
- Yao, Meng Chao * 1986; PhD, 1975, University of Rochester; regulation of gene amplification and chromosome rearrangements in *Tetrahymena*.
- Young, Elton * 1969; PhD, 1967, California Institute of Technology; regulation of gene activity in the yeast *Saccharomyces cerevisiae*.

Associate Professors

- Bakken, Aimee * 1973; PhD, 1970, University of Iowa; gene regulation during oogenesis and embryogenesis, developmental, cellular and molecular biology.
- Bomszyk, Karol 1983; MD, 1977, University of Rochester; nephrology.
- Braun, Robert Elmer * 1986; PhD, 1985, Tufts University; mouse molecular genetics and male germ cell development.
- Breedan, Linda 1994; PhD, 1981, University of Colorado (Boulder); events that control the G1/S transition in *Saccharomyces cerevisiae*.
- Campbell, Lee Ann * 1985; PhD, 1982, Pennsylvania State University; molecular biology and pathogenic mechanisms of chlamydiae.
- Carlson, Steven S. * 1985; PhD, 1975, University of California (Berkeley); molecular and cellular physiology of synaptic transmission.
- Chavkin, Charles * 1984; PhD, 1982, Stanford University; cell and molecular mechanisms of psychoactive opiate drugs to understand normal and pathophysiology.
- Comai, Luca * 1989; PhD, 1980, University of California (Davis); chromatin and gene regulation, polyploidy, axil development.
- Cooper, Jonathan A. * 1987; PhD, 1976, University of Warwick (UK); regulation of cellular metabolism and proliferation by protein phosphorylation.
- Davis, Trisha Nell * 1987; PhD, 1983, Yale University; the function of calcium-binding proteins in cell growth.
- Emerman, Michael 1994; PhD, 1986, University of Wisconsin; function of HIV genes, tropism of HIV.
- Farr, Andrew G. * 1982; PhD, 1975, University of Chicago; cell interactions governing lymphocyte production and function.
- Geballe, Adam Philip 1988; MD, 1978, Duke University; virology.
- Graubard, Katherine * 1979, (Research); PhD, 1973, University of Washington; cellular neurophysiology, neural basis of behavior.
- Henikoff, Steven 1982; PhD, 1977, Harvard University; gene and chromosome organization in *Drosophila*.
- Hinrichsen, Robert Dale 1994; PhD, 1982, Indiana University; genetic and biochemical analysis of ion channels in *Paramecium*, behavioral genetics.
- Howard, Jonathon * 1989; PhD, 1983, Australian National University; biophysics of molecular motors.
- Hughes, Kelly T. * 1989; PhD, 1984, University of Utah; genetics, gene regulation, microbial physiology, and metabolism.
- Kimelman, David * 1989; PhD, 1985, Harvard University; molecular biology of early development in the frog, *Xenopus laevis*.

- Klavit, Rachel E. * 1983; DPhil, 1981, Oxford University (UK); molecular recognition, protein NMR.
- Leigh, John A. * 1985; PhD, 1983, University of Illinois; bacterial physiology, biochemistry, genetics.
- Levis, Robert W. 1994; PhD, 1978, Massachusetts Institute of Technology; structure and function of telomeres in *Drosophila*, transposable genetic elements
- Lewis, David B. * 1988; MD, 1981, University of California (San Francisco); T lymphocyte cytokine biology, infectious diseases.
- Manoil, Colin C. * 1986; PhD, 1979, Stanford University; molecular genetics, protein localization in bacteria.
- Monnat, Raymond J. Jr. * 1982; MD, 1976, University of Chicago; somatic mutation, somatic cell molecular genetics, human genetic disease.
- Moon, Randall T. * 1985; PhD, 1982, University of Washington; embryonic development; signal transduction.
- Moseley, Stephen L. * 1985; PhD, 1981, University of Washington; molecular basis of pathogenesis in *E. coli* diarrhea.
- Overbaugh, Julie Maureen * 1988; PhD, 1983, University of Colorado (Boulder); molecular mechanisms of virus-host cell interactions/retroviral pathogenesis/aids.
- Palczewski, Krzysztof * 1992; MS, 1980, PhD, 1986, Technical University of Wrocław (Poland); visual transduction.
- Parsons, Marilyn * 1981; PhD, 1979, Stanford University; signal transduction and organelle biogenesis in African trypanosomes.
- Priess, James R. * 1993; PhD, 1983, University of Colorado (Boulder); reliability models, fault trees.
- Reuveni, Zippora * 1982, (Research); PhD, 1979, University of Windsor (Canada); myogenesis during growth development and regeneration of skeletal muscle.
- Riley, Donald E. * 1982, (Research); PhD, 1976, University of Washington; pathogenic research and diagnosis involving DNA sequences.
- Rosenfeld, Michael E. * 1992; PhD, 1981, University of Wisconsin; mechanisms of atherogenesis and macrophage gene expression.
- Soriano, Philippe 1994; PhD, 1978, University of Paris; mammalian developmental genetics
- Stenkamp, Ronald E. * 1978; PhD, 1975, University of Washington; crystallography, metalloproteins, protein engineering, blood clotting proteins.
- Tempel, Bruce L. * 1988; PhD, 1983, Princeton University; molecular neurobiology/neurogenetics, especially potassium channel gene structure and function.
- Thomas, James H. * 1988; PhD, 1985, Massachusetts Institute of Technology; genetics of development and the nervous system in nematodes.
- Thouless, Margaret E. * 1980; PhD, 1974, University of Birmingham (UK); retroviruses, herpes viruses, enteric viruses, immunodiagnosis, virus variability.
- Van Volkenburgh, Elizabeth * 1987; PhD, 1980, University of Washington; leaf growth and development, photobiology and electrophysiology.
- Wakimoto, Barbara T. * 1984; PhD, 1981, Indiana University; developmental genetics, gene expression and chromosome organization in eukaryotes.
- Wong, Timothy Chee-Hing * 1983; PhD, 1979, University of Texas, Southwestern; viral gene expression in chronic infections and oncogenesis.
- Baker, David * 1993; PhD, 1989, University of California (Berkeley); protein folding.
- Berg, Celeste A. * 1990; PhD, 1986, Yale University; *Drosophila* developmental genetics: cell communication and cell migration during oogenesis.
- Blochlinger, Karen 1994; PhD, 1986, Swiss Institute for Cancer Research; specification of neural identity in the peripheral nervous system of *Drosophila*.
- Bosch, Marnix L. * 1994; MS, 1984, University of Utrecht (Netherlands); PhD, 1987, University of Leiden (Netherlands); molecular virology of lentiviruses and herpes viruses, as well as animal models for viral diseases.
- Cooper, Mark S. * 1990; PhD, 1985, University of California (Berkeley); cellular physiology and cell motility in developing tissues.
- Edgar, Bruce A. 1994; PhD, 1987, University of Washington; genetic control of cell division patterns in the *Drosophila* embryo.
- Fink, Pamela J. * 1990; PhD, 1981, Massachusetts Institute of Technology; T cell differentiation, tolerance induction, molecular and cellular immunology.
- Foot, Christopher * 1992; PhD, 1988, University of British Columbia (Canada); behavioral ecology, population genetics and evolutionary biology of fishes.
- Fournier, R. E. Keith 1994; PhD, 1974, Princeton University; regulation of tissue-specific gene expression, somatic cell and molecular genetics
- Giniger, Edward Scott * 1994, (Research); PhD, 1988, Harvard University; neural development, mechanism of axon guidance, genetic specification of brain structure.
- Goverman, Joan M. * 1992; PhD, 1981, University of California (Los Angeles); immune recognition and tolerance, autoimmunity, T cell development, activation, antibody diversity.
- Hahn, Steven M. * 1994; PhD, 1984, Brandeis University; transcription initiation in yeast.
- Hockenberg, David M. * 1994; MD, 1982, Washington University; gastroenterology.
- Howard, Randall F. * 1993; PhD, 1978, University of Minnesota; molecular and cellular biology of malaria parasites; host immune responses.
- Kavanagh, Terrance J. * 1985, (Research); MS, 1980, PhD, 1985, Michigan State University; free radical toxicology, glutathione metabolism, toxicology and aging.
- Lybrand, Terry Paul * 1990; PhD, 1984, University of California (San Francisco); molecular modeling, computer simulation of biomacromolecules, development of simulation analysis.
- Mandoli, Dina F. 1987, (Research); PhD, 1983, Stanford University.
- Martin, David 1990; MD, 1981, Virginia College of Medicine; hematology, oncology.
- Ostrander, Elaine A. 1994; PhD, 1987, Oregon Health Sciences University; study of mammalian behavioral genes
- Pagliaro, Leonard J. * 1991; PhD, 1986, Wesleyan University; in vivo enzymology, cytoplasmic organization, light microscopy, image processing, photobleaching.
- Parkhurst, Susan M. 1994; PhD, 1985, Johns Hopkins University; developmental, genetic and molecular analysis of *Drosophila* embryogenesis.
- Pullen, Ann M. * 1991; PhD, 1987, Cambridge University (UK); thymic and extrathymic T cell development.
- Roberts, James Michael * 1989; MD, 1984, PhD, 1984, Columbia University; how cyclin-kinase complexes regulate events necessary for chromosomal DNA replication.
- Rose, Timothy M. * 1991; PhD, 1981, University of Geneva (Switzerland); molecular biology of tumor viruses, cell growth, differentiation, and transformation.
- Roth, Mark * 1994; PhD, 1984, University of Colorado (Boulder); nuclear proteins involved in the regulation of gene expression.
- Rudensky, Alexander Y. * 1992; PhD, 1986, Gabrichevsky Institute for Epidemiology & Microbiology; antigen processing and presentation, T-cell recognition.
- Ruohola-Baker, Hannele * 1993; PhD, 1989, Helsinki University (Finland); oogenesis, developmental genetics.
- Stayton, Patrick S. * 1992; PhD, 1989, University of Illinois; engineering proteins for biotechnology, biomaterials, and biomedical therapies/diagnostics.
- Stoddard, Barry L. 1994; PhD, 1990, Massachusetts Institute of Technology; structure and function of enzyme catalysts, bacterial signal transduction.
- Strong, Roland K. * 1994; PhD, 1990, Harvard University; structural molecular biology and crystallography of proteins mediating immune responses to antigens.
- Tapscott, Stephen J. 1990; MD, 1982, University of Pennsylvania; neurology, molecular biology.
- Traxler, Beth A. * 1992; PhD, 1987, Carnegie-Mellon University; bacterial physiology, genetics, and membrane protein biochemistry.
- Vogel, Viola * 1990; PhD, 1987, Johann Wolfgang Goethe University (Germany); molecular assemblies and Langmuir-Bodgett films, liquid interfaces, nonlinear optics, microscopy.
- Wordeman, Linda * 1994; PhD, 1988, University of California (Berkeley); mitosis and myofibril formation.
- Wright, Robin L. * 1990; PhD, 1985, Carnegie-Mellon University; membrane dynamics and regulation of sterol biosynthesis in yeast.
- Zagotta, William N. * 1993; PhD, 1989, Stanford University; molecular mechanisms of ion channel function.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

MCB 514, 515, 516 Molecular and Cellular Biology Literature Review (2, 2, 2) Morris Emphasizes critical evaluation of the original literature orally and in writing. Subject matter coordinated with CONJ 501, 502, 503. Open only to first-year students in the Molecular and Cellular Biology Program.

MCB 517, 518 Topics in Molecular and Cellular Biology (1-5, max. 12, 1-5, max. 12) Advanced in-depth coverage of specific areas of molecular and cellular biology of current interest. Lectures by University of Washington faculty involved in research in this area and lectures by invited speakers. A basic knowledge of principles of molecular and cellular biology assumed.

MCB 580 Teaching Practicum in Molecular and Cellular Biology (3, max. 6) Supervised training in the teaching of molecular and cellular biology. Credit/no credit only. Prerequisite: permission of instructor. Offered: AWSps.

MCB 599 Introduction to Research in Molecular and Cellular Biology (*, max. 20) The student rotates through one research laboratory involved in the Interdisciplinary Molecular and Cellular Biology Program per quarter. Open only to first-year students in the Molecular and Cellular Biology Program. Credit/no credit only.

MCB 600 Independent Study or Research (*)

MCB 800 Doctoral Dissertation (*)

Assistant Professors

Bejjalleh, Sandra M. * 1995; MS, 1983, University of Illinois; PhD, 1989, University of Wisconsin; molecular neurobiology.

Museology

James Nason, Program Director

The Museology Program is designed to provide the generalized training, knowledge, and skills necessary to pursue a professional career in museum work. The program is directed toward the training of a broad range of museum professionals interested in curation and management of collections in anthropology, art, botany, geology, history, and zoology as well as in interpretive programs and museum administration.

Courses include required core museology subjects as well as a range of classes offering students the chance to specialize in areas of their interests. Course work is divided between the theoretical and practical aspects of museum operations. Classes take the form of lecture courses, seminars, special lectures by guest speakers, field trips, laboratory and collection management courses, practicums and internships. Since admission to the program is highly selective, classes are small and students have close contact with faculty.

Practical experience, an essential component of the program, is provided by several museological institutions at the University of Washington, including the Thomas Burke Memorial Washington State Museum, the Henry Art Gallery, the Herbarium, the Arboretum, the Fish Collection, and the University Libraries. The Burke Museum acts as the coordinating unit of the program. Located on the campus of the University of Washington, the Burke Museum is Washington State's natural history and anthropology museum and is the oldest and largest natural history museum in the Northwest. It has nationally and internationally ranked collections focusing on the anthropology, geology, and zoology of the Pacific region.

Program Requirements

The graduate program in museology generally takes two years to complete. It consists of six quarters of academic study and research. During the first year, students carry an average of between 9 to 15 credits each quarter; during the second year, the number of credits may be fewer. Students may enroll for part-time study, but this is discouraged during the first year.

Requirements for successful completion of the Master of Arts degree include: (1) completion of a minimum of 36 or more quarter credits, including 27 course credits and 9 thesis/thesis project credits, with at least 18 credits of course work numbered 500 or above, including thesis/thesis project; (2) a minimum of three quarters of full-time residence credit or part-time equivalent; (3) demonstration of reading competence in one foreign language, if required by the student's supervisory committee, based on the student's area of specialization; (4) completion of an internship in an off-campus museum or related agency approved by the supervisory committee prior to submission of the student's thesis/thesis project; (5) presentation of a thesis proposal by the beginning of the fourth quarter of study; (6) successful completion of an oral examination, covering both the thesis topic and the field of museology in general, following submission of the thesis/thesis project; and (7) completion of all degree requirements within six years.

The following courses are required of all students unless exempted by petition to the Program Coordinating Committee or credited for relevant course work completed at other universities: MUSEUM 480, 481, 482, 483, 490, 498, 590, 591, 592, 593 or 594, 595, 600, 700 or 710. In addition, two or more courses are required in an academic discipline relevant to the area of specialization.

Admission Deadline

The application deadline for autumn quarter admission is February 15. Applications completed and post-marked on or before this date will be reviewed by the appropriate admission committee. Late applications may be submitted until April 15, although consideration is not guaranteed if enrollment targets have been met.

Correspondence and Information

Terry Duffey
Interdisciplinary Programs
The Graduate School, Box 351240
(206) 543-6398
email: tduffey@u.washington.edu

Faculty

Director

James Nason

Professors

Ammirati, Joseph F. * 1979; MA, 1967, San Francisco State; PhD, 1972, University of Michigan; mycology, taxonomy and ecology of fungi.

Anderson, Judy M. * 1988; MA, 1977, University of California (Berkeley); graphic and informational design for business and institutions, book artist.

Hutterer, Karl L. * 1990; PhD, 1973, University of Hawaii; prehistory, ethnology of Southeast Asia, East Asia.

Kingsbury, Martha * 1968; PhD, 1969, Harvard University; nineteenth and twentieth centuries.

Lockard, Joan S. * 1974; PhD, 1963, University of Wisconsin; primate social behavior, animal behavior, sociobiology, human ethnology, neurobehavior.

Nason, James * 1970; PhD, 1970, University of Washington; sociocultural anthropology, museology, material culture, cultural heritage, Micronesia, North America.

Olstad, Roger G. * 1964, (Emeritus); PhD, 1963, University of Minnesota; science education, teacher education.

Pietsch, Theodore W. * 1978; PhD, 1973, University of Southern California; ichthyology.

Silbergeld, Jerome * 1975; PhD, 1974, Stanford University; Chinese art.

Stein, Julie K. * 1980; MA, 1976, PhD, 1980, University of Minnesota; New World archaeology, Northwest coast archaeology, geoarchaeology, shell middens.

Associate Professors

Andrews, Richard 1987; MA, 1975, University of Washington.

Failing, Patricia A. * 1982; MA, 1974, University of California (Berkeley); contemporary art and criticism.

Fidel, Raya * 1982; PhD, 1982, University of Maryland; information systems, systems analysis, user interaction, classification research.

Hamilton, Clement Wilson * 1985; PhD, 1985, Washington University; landscape plant selection, taxonomy of horticultural and tropical plants.

Kahn, Miriam * 1986; PhD, 1980, Bryn Mawr College; museology, ecology, agricultural development, food symbolism, gender relations, Malaysia and Oceania.

Minah, Galen F. * 1970; MArch, 1968, University of Pennsylvania; design process, design, professional practice.

Wright, Robin K. * 1983; PhD, 1985, University of Washington; Native American art, particularly Northwest coast Indian art.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

MUSEUM 480 Introduction to Museology (3) I&S Museum history, philosophy, and basic operations, including organization, income, collection management, conservation, exhibition, security, education, research, and ethics. Prerequisite: upper-division standing or permission of instructor. Offered: jointly with ANTH 480.

MUSEUM 481 Museum Collection Management: Ethnology (3) I&S Lecture and work experience in museum collection management in the ethnology collections of the Burke Memorial Washington State Museum, including identification, cataloging, fumigation, storage, cleaning, inventory, and specimen preparation for exhibition of archival and nonarchival museum specimens from North America, the Pacific, and Pacific Rim areas. Prerequisite: 480 or permission of instructor. Offered: jointly with ANTH 481.

MUSEUM 482 Museum Conservation (3) I&S Lecture and demonstrations in the recognition in the recognition and treatment of museum conservation problems for specimens of all types. Application of basic principles to specific preventive and active conservation and restoration problems encountered by curatorial personnel. Prerequisites: 480 and 481 or permission of instructor. Offered: jointly with ANTH 482.

MUSEUM 483 Museum Operations Practicum (3, max. 9) Provides students with the opportunity to apply their general museological training in one or more areas of supervised museum operation areas, e.g., registration, education, or exhibition through project-oriented work in the Burke Museum. Prerequisite: permission of instructor.

MUSEUM 488 Special Topics in Museology (3) In-depth examination of selected current issues within the field of museology.

MUSEUM 490 Museum Curation Practicum (1-5, max. 15) The application of museological training in the curation of ethnographic, archeological, geological, or zoological collection materials in the Burke Museum. Work under the supervision of faculty curators ranges from fundamental collection documentation and research to preventive conservation, storage, and other special curation projects. Prerequisite: permission of instructor.

MUSEUM 491 Museum Curation Practicum: General Collections (1-5, max. 15) The application of museological training in the curation of art, botanical, geological, historic, zoological, or other collections. Work under the supervision of faculty curators ranges from fundamental collection documentation to preventive conservation or storage. Prerequisite: permission of instructor.

MUSEUM 590 Seminar in Museum Theory (3) Fundamental theoretical issues involved in current museum administrative and operations work, including administrative structure, organizational conflicts, museum-community relations, and museum educational programming. Prerequisite: permission of instructor. Offered: jointly with ANTH 590.

MUSEUM 591 Seminar in Museum Operations (3) Designing hypothetical museums and creating a first year of operations. Design elements include architectural plan, staffing plan, initial and recurring budgets, security system, records system, educational plan, and policy making. Prerequisite: 590 or permission of instructor. Offered: jointly with ANTH 591.

MUSEUM 592 Seminar in Museum Specimen Documentation (3) Seminar discussion of museum specimen documentation research approaches, including technological and raw material analyses, con-

textual studies, and esthetic studies. Documentation of a collection and reference work. Prerequisites: 590, 591, or permission of instructor. Offered: jointly with ANTH 592.

MUSEUM 593 Museum Exhibition Seminar (3) Review of critical issues in the planning, design, preparation, and installation of museum exhibits, including exhibit conservation, visitor-based design factors, ideological aspects of interpretation, and community relations. Readings and examination of exhibits are combined with case study work.

MUSEUM 594 Seminar in Museum Education (3) Focus on museums as educational institutions with consideration of the place of education in the mission of museums, the educational role of museums compared to that of other institutions, the museum's diverse audiences and their needs, and the educational methods and techniques museums may employ in pursuing their goals. Prerequisite: 480.

MUSEUM 595 Museum Legal and Ethical Issues (3) Survey of the legal and ethical issues regarding international and national museum operations, including the control and movement of cultural property, artistic and intellectual rights and copyright, concepts of patrimony and issues of repatriation, as well as other relevant policies and regulations.

MUSEUM 598 Museum Internship (3-5) Faculty supervised off-campus internships in museums and allied institutions. Each internship is individually established and provides students with practical experience and the opportunity to apply and learn new professional skills. Prerequisite: permission of instructor.

MUSEUM 600 Independent Study or Research (1-9)

MUSEUM 700 Master's Thesis (1-9)

Near and Middle Eastern Studies

The Interdisciplinary Ph.D. Program in Near and Middle Eastern Studies is designed for students who wish to pursue research with a comparative perspective in Near Eastern languages and literature: Arabic, Hebrew, Persian (or Dari or Tajik); Turkish and Central Asian Turkic languages; Near Eastern linguistics; Islamic topics, namely: Islamic law, history, institutions, theology, and mysticism; comparative religion: Judaism, Christianity, and Islam; and interdisciplinary investigations of modern topics using the social sciences. The program is administered by an interdisciplinary Graduate School faculty group. The program of studies includes courses offered in the Department of Near Eastern Languages and Civilization, the Jackson School of International Studies, and other departments on campus. Students in the program must take courses in both the humanities and social sciences.

Degree Requirements and Satisfactory Progress

Specific course work and areas of concentration will be determined by the student's interests within the framework of the degree and satisfactory progress requirements listed below.

1. Within 18 months of admission, demonstration of a general knowledge of history and culture in one of the following general fields: Islamic civilization; Arabic, Hebrew, Persian, Turkish, or Central Asian Turkic languages and literature; the modern Middle East; or comparative religion either through previous degree work or through examination administered by the program.

2. Within three years of admission, completion of two advanced courses in the humanities, one of which must be in the Department of Near Eastern Languages and Civilization (NELC); and two advanced courses in

the social sciences, one of which must be in the Department of History. These courses are in addition to work the student may have done at the B.A. and M.A. level.

3. Within three years of admission, completion of a graduate seminar, or two if none was taken at the M.A. level.

4. A student will be expected to have studied four languages, two of which must be regional languages and one of which must be a Western European language other than English, such as French, German, Italian, Russian, or Spanish. Within three years of admission, a student must acquire a reading knowledge of a pertinent research language different from the two languages offered at the time of admission. Before the oral examination listed below may be taken, the student must complete the language requirements including the second-year level in a regional language different from the two languages offered at the time of admission if both were not regional languages.

Annual Review

A subcommittee of the Near and Middle Eastern Studies program faculty will meet each spring to review the progress of all students in the Ph.D. program. Either the chair of the student's committee, the program's graduate adviser, or the program's director will inform students of the results of this annual review.

Ph.D. Examinations and Dissertation

The student will be expected to take the following examinations: (1) preliminary exams consisting of an area of specialization exam and a theory and discipline exam; (2) General Examination, consisting of a take-home part and an oral part; and (3) Final Examination, which is the Ph.D. thesis defense.

Students must meet the general University requirements concerning admission to candidacy for the doctoral degree, the dissertation, and final examinations, including an oral examination.

A student's Ph.D. Supervisory Committee shall consist of no less than three members of the University of Washington's Graduate School faculty as well as a representative of the Graduate School (GSR). The chair of the committee must be an active member of the Graduate School faculty. At least two members of the committee must be members of the Near and Middle Eastern Studies faculty group. Additional members may be asked to join the committee.

Students will write a dissertation as the final requirement for the Ph.D. degree. The topic of the dissertation will be set in consultation with the Ph.D. candidate's supervisory committee.

Admission Deadline

The application deadline for autumn quarter admission is February 1. Applications which are completed and postmarked on or before this date will be reviewed by the appropriate admission committee. Late applications may be submitted until April 15, although consideration is not guaranteed if enrollment targets have been met.

Correspondence and Information

Terry Duffey
Interdisciplinary Programs
The Graduate School, Box 351240
(206) 543-6398
email: tduffey@u.washington.edu

Charlotte Albright
Middle East Center, Box 353650
Jackson School of International Studies
(206) 543-4227

Faculty

Director

Jere L. Bacharach

Professors

Bacharach, Jere L. * 1967; MA, 1962, Harvard University; PhD, 1967, University of Michigan; history of the Middle East, Islamic.

Brame, Michael K. * 1974; PhD, 1970, Massachusetts Institute of Technology; syntax, phonology, structure of Arabic and English.

Cirtautas, Ilse D. * 1968; PhD, 1958, University of Hamburg (Germany); Turkic languages and literatures.

Heer, Nicholas L. * 1965, (Emeritus); PhD, 1955, Princeton University; Arabic language and literature, Islamic theology and philosophy.

Jaffee, Martin S. * 1987; PhD, 1980, Brown University; rabbinic religion and literature in late antiquity.

Kaisse, Ellen * 1976; PhD, 1977, Harvard University; phonology, historical linguistics, ancient and modern Greek/Spanish, syntax-phonology interface.

MacKay, Pierre A. * 1966; PhD, 1964, University of California (Berkeley); Greek literature, post-classical and Byzantine Greek literature, numismatics.

Sakata, Hiromi L. * 1977; MA, 1968, PhD, 1976, University of Washington; ethnomusicology.

Wenke, Robert J. * 1975; PhD, 1975, University of Michigan; archaeology of Egypt, the Middle East, and quantitative methods.

Williams, Michael A. * 1976; PhD, 1977, Harvard University; early Christianity and religions of antiquity.

Ziadeh, Farhat J. * 1966, (Emeritus); LLB, 1940, University of London (UK); Arabic language and literature, Islamic law, Islamic institutions.

Associate Professors

Goldberg, Ellis * 1985; PhD, 1983, University of California (Berkeley); political economy of the Middle East, comparative politics.

Karimi-Hakkak, Ahmad * 1985; PhD, 1979, Rutgers University; Persian language and literature, Iranian culture and civilization.

Kasaba, Resat * 1985; PhD, 1985, State University of New York (Binghamton); historical sociology, world systems, social change in the Middle East.

Sokoloff, Naomi B. * 1985; PhD, 1980, Princeton University; Hebrew language and literature.

Waugh, Daniel Clarke * 1972; PhD, 1972, Harvard University; medieval Russian history.

Assistant Professors

DeYoung, Terri L. * 1991; PhD, 1988, University of California (Berkeley); Arabic language and literature.

Silay, Kemal * 1993; PhD, 1993, Indiana University; Turkish language and literature, Ottoman philology and literature, Turkish folklore.

Neurobiology and Behavior

Co-Directors

Neil M. Nathanson
Albert F. Fuchs

K536B Health Sciences

Graduate Program

The University of Washington offers an interdisciplinary, degree-granting Graduate Program in Neurobiology and Behavior involving faculty in the departments of Biochemistry, Biological Structure, Pharmacology, Physiology and Biophysics, Psychiatry and Behavioral Sciences, Psychology, Speech and Hearing Sciences, and Zoology. The academic program leading to the Ph.D. degree provides a broad background in neurosciences and extensive training in the application of modern experimental methods to fundamental problems in neuroscience. Within this overall program, students choose between two curricular pathways—molecular and cellular neuroscience or systems and behavioral neuroscience. The two pathways are curricular choices which may differ in required and recommended courses and which provide both students and interested faculty with an opportunity for more specialized scientific interactions than might be appropriate in program-wide forums. Students are free to switch between these curricular pathways throughout their first year in the program.

First-year students in the program take a series of graduate-level neuroscience courses that includes the core of general neuroscience knowledge: cellular neurophysiology, cellular and molecular neurobiology, developmental neurobiology, neuroanatomy, systems neurobiology, neuropharmacology, and behavioral neuroscience. Emphasis is placed on critical evaluation of the original literature and exposure to current experimental methods. Students begin active research during their first year. All students are required to do rotations in three different neuroscience laboratories. Research opportunities for students include vertebrate and invertebrate neurophysiology, membrane biophysics, neuropharmacology, behavioral neuroscience, molecular neurobiology, neuroanatomy, systems neurobiology, and developmental neurobiology. More than 65 faculty members participate in the program.

Application Process

Students who have emphasized either biological or physical sciences in their undergraduate careers are invited to apply. Applicants are requested to send a copy of their academic record; GRE scores, including, if possible, scores on a subject test such as chemistry, physics, molecular and cellular biology, psychology, or biology; and three letters of recommendation from the persons who can best evaluate their potential for success in graduate study. New students enter the graduate program September 15. Applications are considered and students are accepted until January 15. Applications received after January 15 are considered only in unusual circumstances.

Research Facilities

Participating departments are located in the Health Sciences Center and in the College of Arts and Sciences. Because the program is interdisciplinary, extensive research facilities in all areas of neurosciences are available to the student. The University maintains two major natural and health sciences libraries in addition to individual departmental libraries. Facilities in the participating departments include electronics and machine shops, instrumentation for synthesis and sequence determination of nucleic acids and proteins,

calcium imaging, confocal microscopy, and computer facilities. Equipment for ultrastructural studies is readily available. The resources of the Regional Primate Research Center, the W. M. Keck Center for Advanced Studies in Neural Signaling, and the Friday Harbor Laboratories are also available to the student.

Financial Aid

The program offers full stipend and tuition support to students through traineeships derived from NIH training grants and private foundation support and through research assistantships supported by the University or research grant monies. Students with satisfactory academic progress can anticipate that funding will continue for the duration of their program.

Correspondence and Information

Graduate Program in Neurobiology and Behavior
Box 357750
(206) 685-1647
email: neubehav@u.washington.edu

Faculty

Director

Neil M. Nathanson

Professors

Anderson, Marjorie E. * 1971; PhD, 1969, University of Washington; physiology of basal ganglia and cerebellum.

Baskin, Denis G. * 1979, (Research); PhD, 1969, University of California (Berkeley); histology, cytochemistry, neuroendocrinology.

Beavo, Joseph A. * 1977; PhD, 1970, Vanderbilt University; roles and molecular mechanisms of cyclic nucleotide phosphodiesterase regulation of cell function.

Beecher, Michael D. * 1978; MA, 1965, PhD, 1970, Boston University; animal communication, animal behavior, sensory processes.

Berger, Albert J. * 1978; MA, 1965, PhD, 1967, Princeton University; PhD, 1976, University of California (San Francisco); neural and chemical control of respiration.

Bernstein, Ilene L. * 1978; MA, 1967, Columbia University; PhD, 1972, University of California (Los Angeles); behavioral neuroscience, mechanisms affecting appetite and taste preference.

Binder, Marc D. * 1978; PhD, 1974, University of Southern California; organization of spinal reflexes.

Bothwell, Mark A. 1985; PhD, 1975, University of California (Berkeley); molecular and cellular physiology of nerve growth factors.

Byers, Margaret R. * 1972, (Research); PhD, 1969, Harvard University; somatosensory receptor structure, cytochemistry, and pathologic reactions; neuroimmune interactions.

Catterall, William A. * 1977; PhD, 1972, Johns Hopkins University; molecular biology of ion channels, molecular pharmacology and neurobiology.

Crill, Wayne E. * 1967; MD, 1962, University of Washington; properties of cortical neurons.

Detwiler, Peter B. * 1977; PhD, 1970, Georgetown University; physiology of photoreceptors.

Diaz, Jaime * 1978; PhD, 1975, University of California (Los Angeles); brain development, developmental psychopharmacology, neurophysiology.

Dorsa, Daniel M. * 1981; PhD, 1977, University of California (Davis); neuropharmacology, neurochemistry.

Edwards, John S. * 1967; PhD, 1960, Cambridge University (UK); arthropod neurobiology, insect physiology and development, tundra and alpine biology.

Felz, Eberhard * 1975; PhD, 1966, Massachusetts Institute of Technology; cortical regulation of movement.

Fuchs, Albert F. * 1969; PhD, 1966, Johns Hopkins University; oculomotor physiology.

Hendrickson, Anita E. * 1969; PhD, 1964, University of Washington; neuroanatomy, morphology and development of primate retina.

Hille, Bertil * 1968; PhD, 1967, Rockefeller University; ion channels of excitable membranes.

Horita, Akira * 1950; PhD, 1954, University of Washington; neuropsychopharmacology.

Kuhl, Patricia K. * 1976; MA, 1971, PhD, 1973, University of Minnesota; speech perception.

McKnight, G. Stanley * 1979; PhD, 1976, Stanford University; phosphorylation; gene expression and neuroendocrine physiology in mice using genetic approaches.

Moody, William J. * 1982; PhD, 1977, Stanford University; single cell electrophysiology, development of electrical properties in embryos.

Nathanson, Neil M. * 1979; PhD, 1975, Brandeis University; molecular analysis of neural signal transduction by muscarinic neurokinin receptors.

Palka, John M. * 1969; PhD, 1965, University of California (Los Angeles); neurophysiology, sensory physiology, developmental neurobiology.

Reh, Thomas A. * 1989; PhD, 1981, University of Wisconsin; regeneration and development of central nervous system.

Riddiford, Lynn M. * 1973; PhD, 1961, Cornell University; insect development and physiology, invertebrate endocrinology.

Rubel, Edwin W. * 1986; PhD, 1969, Michigan State University; developmental neurobiology, with special emphasis on vertebrate auditory system development.

Schwartzkroin, Philip A. * 1978; PhD, 1972, Stanford University; mechanisms of cortical excitability.

Schwindt, Peter C. * 1974; PhD, 1972, University of Washington; properties of spinal and cortical neurons, mechanisms of repetitive firing and convulsive activity.

Smith, Orville A. * 1958; PhD, 1953, Michigan State University; central regulation of cardiovascular function.

Stahl, William L. * 1967; PhD, 1963, University of Pittsburgh; neurochemistry of brain ATPase systems.

Steiner, Robert A. * 1977; PhD, 1975, University of Oregon; neuroendocrinology.

Storm, Daniel R. * 1978; PhD, 1971, University of California (Berkeley); molecular basis of neuroplasticity; cAMP and Ca²⁺ signal transduction systems in the CNS.

Teller, Davida Y. * 1965; PhD, 1965, University of California (Berkeley); vision, color vision, development of vision in infants.

Towe, Arnold L. * 1953, (Emeritus); PhD, 1953, University of Washington.

Truman, James W. * 1973; PhD, 1970, Harvard University; hormones and invertebrate behavior, insect physiology, circadian rhythms.

Westrum, Lesnick E. * 1966; MD, 1963, University of Washington; PhD, 1966, University College, London (UK); neuroanatomy, synaptology, plasticity, olfactory and trigeminal systems, dental pathways.

Willows, A. O. Dennis * 1969; PhD, 1967, University of Oregon; invertebrate neurophysiology, neural mechanisms underlying behavior.

Wingfield, John C. * 1985; PhD, 1973, University College of North Wales (UK); environmental and hormonal control of avian reproductive cycles.

Winn, H. Richard * 1983; MD, 1968, University of Pennsylvania; physiology of cerebral blood flow regulation.

Woods, Stephen C. * 1972; PhD, 1970, University of Washington; physiological psychology, regulatory behavior, conditioned drug effects.

Associate Professors

Brenowitz, Eliot A. * 1987; PhD, 1982, Cornell University; animal behavior, neuroethology, neuroendocrinology, animal communication.

Carlson, Steven S. * 1985; PhD, 1975, University of California (Berkeley); molecular and cellular physiology of synaptic transmission.

Chavkin, Charles * 1984; PhD, 1982, Stanford University; cell and molecular mechanisms of psychoactive opiate drugs to understand normal and pathophysiology.

Dacey, Dennis M. * 1986; (Research); PhD, 1983, University of Chicago; the neural basis of vision and the organization of primate retina.

Graubard, Katherine * 1979; (Research); PhD, 1973, University of Washington; cellular neurophysiology, neural basis of behavior.

Harris, Roger M. * 1982; PhD, 1975, University of Washington; neuro-anatomical recovery from spinal cord injury.

Howard, Jonathon * 1989; PhD, 1983, Australian National University; biophysics of molecular motors.

Miller, Margaret A. 1981; PhD, 1984, University of Washington.

Moon, Randall T. * 1985; PhD, 1982, University of Washington; embryonic development; signal transduction.

Olavarria, Jaime F. * 1990; MD, 1974, State University of Chile; PhD, 1984, University of California (Berkeley); visual system: anatomy and physiology, comparative and developmental studies.

Palczewski, Krzysztof * 1992; MS, 1980, PhD, 1986, Technical University of Wroclaw (Poland); visual transduction.

Sherk, Helen * 1982; PhD, 1978, Massachusetts Institute of Technology; neural mechanisms underlying vision, especially visual guidance during locomotion.

Tempel, Bruce L. * 1988; PhD, 1983, Princeton University; molecular neurobiology/neurogenetics, especially potassium channel gene structure and function.

Werner, Lynne A. * 1986; PhD, 1980, Loyola University (Chicago); auditory development, infant psychoacoustics.

Assistant Professors

Bejjaleh, Sandra M. * 1995; MS, 1983, University of Illinois; PhD, 1989, University of Wisconsin; molecular neurobiology.

Jones, Theresa A. 1996; PhD, 1992, University of Texas (Austin); synaptic plasticity and recovery from brain damage.

Raible, David W. 1995; PhD, 1989, University of Pennsylvania; zebrafish neural development.

Roelink, Henk 1996; MSc, 1985, University of Groningen (Netherlands); PhD, 1991, University of Amsterdam (Netherlands); role of signaling molecules in mediating neural tissue differentiation during vertebrate development.

Shadlen, Michael N. 1995; PhD, 1985, University of California (Berkeley); MD, 1988, Brown University; visual perception.

Zagotta, William N. * 1993; PhD, 1989, Stanford University; molecular mechanisms of ion channel function.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

BEH NR 535 Issues in Behavioral Neuroscience (3) Provides faculty-guided readings and discussions of original papers in behavioral neuroscience.

BEH NR 564, 565 Current Issues in Behavioral Neuroscience (3, 3) Considers the neural substrate of several different behaviors, e.g., learning and memory, visual perception, vocal communication, taste aversion, through lectures and reading of original literature. Students have opportunities to lead discussion groups and develop writing skills. Prerequisite: knowledge of basics of neuroscience.

BEH NR 800 Doctoral Dissertation (*, max. 9) Offered: AWPSP.

Nutritional Sciences

Elaine R. Monsen, Graduate Program Coordinator

The Nutritional Sciences Program offers an interdisciplinary graduate program of study leading to a Master of Science or a Doctor of Philosophy degree. In addition, training is provided in advanced nutrition and its application to the field of clinical dietetics through both didactic and clinical experiences. Four types of students are best served by this program: (1) the individual with a strong science background who wishes to pursue advanced training in nutritional sciences; (2) the individual who wishes to complete academic requirements (ADA-approved didactic plan) for becoming a registered dietitian; (3) the individual with an undergraduate background in nutrition, dietetics and foods who wishes to pursue additional education in nutritional sciences while obtaining the supervised clinical experience required for registered dietitian status (ADA-approved AP-4); and (4) the individual who is a registered dietitian and wishes to pursue an advanced degree in nutritional sciences.

Principal areas of study include clinical nutrition, community nutrition, maternal and child nutrition, public health nutrition, and nutritional biochemistry. The faculty is composed of a core group in nutrition plus a larger affiliated group representing relevant fields within the Schools of Public Health, Medicine, and Nursing, the Division of Food Science in the College of Ocean and Fishery Sciences, and the College of Arts and Sciences.

Each individual program of study is designed by the student in consultation with, and with the approval of, a supervisory committee. Not only will appropriate course work be carefully defined, but collaboration between student and faculty in appropriate (thesis) research will begin as early in the graduate experience as possible. Those students receiving supervised clinical experience will work closely with the coordinator of clinical activities, so the program of experiences meets ADA requirements.

Research Facilities

Support facilities are available in the form of libraries, laboratories, a nutrient data base, computer facilities, a human metabolic unit, and a vivarium. Additional support is available through the Clinical Research Center, the Clinical Nutrition Research Unit, the Northwest Lipid Research Center, and the Nutrition Metabolism Division of the Department of Laboratory Medicine in the School of Medicine. Clinical facilities available for supervised clinical experience include University of Washington Medical Center, Harborview Medical Center, Fred Hutchinson Cancer Research Center, Northwest Kidney Center, Children's Hospital and Medical Center, Pacific Medical Center, and the Center for Human Development and Disabilities.

Admission Requirements

Students may enter the graduate degree program after completing a bachelor's and/or master's degree in the biological sciences; background in human physiology and biochemistry is especially desirable. Those students who wish to pursue registration status with the Commission on Dietetic Registration must complete ADA-approved Plan 4 or Plan 5 academic requirements prior to applying for the supervised clinical experience program (AP-4). Students who wish to pursue the Ph.D. degree should correspond with the Director of the Nutritional Sciences Group for detailed admission requirements.

Correspondence and Information

Director
Nutritional Sciences Program
305 Raitt, Box 353410

Faculty

Director

Elaine R. Monsen

Professors

Albers, John J. * 1971, (Research); MS, 1967, PhD, 1969, University of Illinois; lipoprotein metabolism and pathophysiology.

Austin, Melissa A. * 1988; PhD, 1985, University of California (Berkeley); genetic epidemiology of lipoproteins, coronary heart disease and cancer.

Benedetti, Thomas J. * 1979; MD, 1973, University of Washington; perinatal medicine.

Blagg, Christopher R. 1966; MD, 1954, MBChB, 1954, University of Leeds (UK); nephrology.

Bowen-Pope, Daniel * 1979; PhD, 1979, University of California (Berkeley); gene regulation, growth factors and receptors.

Brown, B. Greg 1981; MD, 1969, PhD, 1969, Johns Hopkins University; cardiology.

Brown, Zane A. * 1977; MD, 1966, Temple University; insulin requiring diabetes complicating pregnancy, genital herpes complicating pregnancy.

Brunzell, John D. * 1969; MD, 1963, University of Washington; nutritional and metabolic aspects of lipoproteins and diabetes.

Chait, Alan * 1977; MBChB, 1967, MD, 1974, University of Capetown (South Africa); clinical nutrition with special emphasis on lipid metabolism.

Chesnut, Charles * 1974; MD, 1966, University of Florida; nuclear medicine.

Dellinger, E. Patchen * 1977; MD, 1970, Harvard University; general and gastrointestinal surgery.

Emanuel, Irvin * 1966; MD, 1960, University of Rochester; child development and mental retardation.

Ensink, John W. * 1961; MC/CM, 1956, McGill University (Canada); the role of GI hormones in fuel homeostasis.

Fujimoto, Wilfred Y. * 1970; MD, 1965, Johns Hopkins University; metabolism, endocrinology, nutrition.

Heitkemper, Margaret M. * 1981; MN, 1975, University of Washington; PhD, 1981, University of Illinois; gastroenterology, enteral nutrition, gerontology.

Henderson, Maureen M. * 1975; MBBS, 1949, DPH, 1956, University of Durham (UK); epidemiology of chronic diseases.

Jurkovich, Gregory J. 1988; MD, 1978, University of Minnesota; general surgery.

Kiyak, H. Asuman * 1972; MA, 1974, PhD, 1977, Wayne State University; geriatric dentistry, behavioral aspects of health care.

Knopp, Robert H. * 1974; MD, 1964, Cornell University; metabolism and endocrinology.

Koepsell, Thomas D. * 1979; MD, 1972, Harvard University; MPH, 1979, University of Washington; chronic diseases, applying epidemiologic concepts to medical practice.

Kronmal, Richard A. * 1964; PhD, 1964, University of California (Los Angeles); nonparametric density estimation, computer algorithms, cardiovascular data analysis, clinical trials.

Marlatt, G. Alan * 1972; PhD, 1968, Indiana University; health psychology and addictive behaviors (relapse prevention and harm reduction).

Monsen, Elaine R. * 1969; MS, 1959, PhD, 1961, University of California (Berkeley); nutrition, dietetics.

Omenn, Gilbert S. * 1981; MD, 1965, Harvard University; PhD, 1972, University of Washington; genetic predisposition to environmental and occupational hazards.

Porte, Daniel Jr. 1965; MD, 1957, University of Chicago; metabolism and endocrinology.

Potter, John D. 1995; MBBS, 1971, PhD, 1984, University of Queensland (Australia); cancer epidemiology and prevention.

Ross, Russell * 1962; DDS, 1955, Columbia University; PhD, 1962, University of Washington; atherosclerosis, growth factors, inflammation, vascular biology.

Saunders, David R. * 1965, (Emeritus); MD, 1957, McGill University (Canada); intestinal absorption, effect of drugs on GI mucosa.

Schwartz, Robert S. * 1982; MD, 1974, Ohio State University; internal medicine and geriatrics.

Scott, C. Ronald * 1965; MD, 1959, University of Washington; diagnosis and nutritional management of genetic disorders of children.

White, J. Emily * 1982; PhD, 1982, University of Washington; cancer control research and prevention, epidemiologic methods, Alzheimer's disease.

Whorton, James C. * 1970; PhD, 1969, University of Wisconsin; history of medicine, public health, pharmacy and alternative healing.

Woods, Stephen C. * 1972; PhD, 1970, University of Washington; physiological psychology, regulatory behavior, conditioned drug effects.

Associate Professors

Ahmad, Suhail 1976; MBBS, 1968, University of Allahabad (India); nephrology.

Beresford, Shirley A. * 1987; PhD, 1981, University of London (UK); cancer prevention, especially dietary factors; diet and exercise in disease prevention.

Dong, Faye M. * 1982; PhD, 1976, University of California (Davis); fish nutrition, seafood quality.

Elmer, Gary W. * 1971; PhD, 1970, Rutgers University; medicinal chemistry.

Faine, Mary P. 1982; MS, 1975, University of Washington; nutrition.

Kristal, Alan R. * 1987; DPH, 1983, Columbia University; nutritional epidemiology, dietary behavior, nutrition intervention, and cancer control.

Le Boeuf, Renee C. * 1987, (Research); PhD, 1977, State University of New York (Buffalo); genetic and nutritional regulation of proteins involved in lipid transport.

Lipkin, Edward W. * 1981; PhD, 1976, MD, 1978, Case Western Reserve University; mineral metabolism, nutrition support, non-human primate physiology.

McCann, Barbara S. 1986; MS, 1982, PhD, 1984, Rutgers University; psychology.

Pearlman, Robert A. * 1981; MD, 1975, Boston University; gerontology.

Rasco, Barbara A. * 1984; PhD, 1983, University of Massachusetts; JD, 1985, Seattle University; food chemistry, fisheries technology, aquaculture, food safety, food law, products liability.

Rosenfeld, Michael E. * 1992; PhD, 1981, University of Wisconsin; mechanisms of atherogenesis and macrophage gene expression.

Siscovick, David S. * 1987; MD, 1976, University of Maryland; epidemiology.

Weigle, David S. 1981; MD, 1978, Harvard University; endocrinology and metabolism.

Assistant Professors

Bankson, Daniel D. 1993, (Clinical); PhD, 1985, Massachusetts Institute of Technology; nutritional status of antioxidants and fat-soluble vitamins.

Cheney, Carrie L. * 1990; PhD, 1989, University of Washington; role of nutrition in cancer prognosis and secondary prevention.

Kestlin, Mark * 1990; PhD, 1989, Flinders University (Australia); MPH, 1990, Harvard University; relationship between nutrition, cancer and cardiovascular disease.

Lecturers

Adams, Susan L. 1979; MS, 1988, University of Washington; clinical dietetics and research, critical care nutritional support.

Aker, Sandra 1977; BS, 1981, University of Utah; medically optimal nutrition support for immunocompromised patients.

Karceck, Joan Marie * 1974; MS, 1969, Case Western Reserve University; applied nutrition including food intake methods and clinical dietetic practice.

Lucas, Betty L. 1974; MPH, 1969, University of California (Berkeley); maternal and child nutrition.

Rees, Jane 1973; MS, 1972, University of Washington; adolescent medicine, nutrition.

Trahms, Cristine M. 1973; MS, 1972, University of Washington; maternal and child nutrition.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

NUTR 300 Nutrition for Today (3) NW Basic and applied nutrition and food science. Includes identification and physiological roles of nutrients, nutritional requirements, problems with over- and undernutrition, and nutritional and food-related diseases. Food additives, processing, safety, and their effects on overall nutrition. Current issues of public significance. Offered: jointly with FD SC 300.

NUTR 301 Nutrition and Nursing (3) NW Basic principles of nutrition and their relationship to health problems. Normal nutrition needs of individuals at various age levels; environmental influences on nutrition; assessment of nutritional status; nutritional values of foods; dietary modifications as appropriate in the nutritional component of medical treatment. Prerequisite: organic chemistry. Offered: A.

NUTR 441 Food Structure and Preparation (3) Review of relationships between food quality and food handling. Principles of food science integrated with laboratory sessions that observe the effects of various parameters on food composition and quality. Prerequisite: organic chemistry.

NUTR 445 Food Service Management (3) Objectives of management in a food service system; purchasing systems currently in use, receiving systems, inventory control, menu planning, cost control, service styles, and sanitation requirements. Prerequisite: 441.

NUTR 481 Diet Therapy (4) Karceck Nutrition in the etiology and treatment of disease and in the maintenance of health. Various organ systems are discussed: pathology, medical/surgical treatment and dietary management, with emphasis on counseling skills. Prerequisites: basic nutrition and P BIO 405-406 or CONJ 340, 341, 342.

Courses for Graduates Only

NUTR 500 Graduate Seminar: Current Issues in Nutrition (1, max. 4) Addresses current topics in the Nutrition and Applied Nutrition literature and provides a forum for student and faculty presentation and review of current research efforts. Prerequisite: graduate student in nutrition. Offered: AWSp.

NUTR 520 Protein and Carbohydrate Nutrition (4) Monsen, Rosenfeld Metabolic and physiologic concepts related to protein and carbohydrate nutrition. Areas address include composition of foods, requirements through the life cycle, quality of protein, vegetarianism, protein deficiency, low carbohydrate diets, glycemic response to foods, carbohydrates and dental caries, inborn errors in carbohydrate and protein metabolism. Prerequisite: biochemistry. Offered: A.

NUTR 521 Lipid Nutrition (4) Monsen, Rosenfeld Normal lipid components of animal fluids and tissues, with review of their metabolism and physiological functions. Effect of diet and the normal development during the life span of these lipid metabolism. Changes of lipids with various types of disease states and means of nutritional modification of these changes. Prerequisite: biochemistry. Offered: W.

NUTR 522 Vitamin and Mineral Nutrition (4) Monsen, Rosenfeld Advanced study of biologically essential minerals and vitamins. To include absorption, transport, function, storage, excretion; imbalance, deficiency and toxicity; dietary sources; role of these nutrients in prevention diseases directly or indirectly (such as cancer, dental caries); role of modern food technology on availability of these nutrients in our food supply. Prerequisite: biochemistry. Offered: Sp.

NUTR 525 Evaluation of Nutritional Status (3) Monsen Dietary, clinical, and biochemical-biophysical components in the assessment of nutritional status. Interrelationships of nutrients and effects of varying levels of nutrient intake. Critical appraisal of nutritional status surveys. Experimental design and dietary methodology. Prerequisites: human nutrition and biochemistry. Offered: 1997; A.

NUTR 526 Maternal and Infant Nutrition (3) Influence of nutrition on fertility and on the course and outcome of pregnancy. Nutritional management of high-risk pregnancy. Nutritional needs during lactation and effect of maternal diet on milk composition. Breast-feeding versus bottle-feeding; fundamentals of infant nutrition. Nutritional management of high-risk infants. Prerequisites: human nutrition and human physiology. Offered: W.

NUTR 527 Nutrition: Childhood Through Adolescence (3) Rees, Trahms, Influence of nourishment on growth, development, and behavior of children, toddlers through adolescents. Critical evaluation of normative data, special problems, and intervention strategies for individual as well as public health programs. Prerequisites: human nutrition and human physiology. Offered: 1998; Sp.

NUTR 528 Nutrition in Aging (3) Karceck Physiological, psychological, social, cultural, and economic factors affecting nutrition in the middle and later years. Prerequisites: human nutrition and human physiology. Offered: 1997; Sp.

NUTR 529 Evaluation of Nutrition Research and Literature (3) Critical review of selected nutrition literature. Evaluation of experimental design, research protocols, data analyses, and application in nutritional science.

NUTR 531 Community Nutrition (3) Nutrition-related health issues in the United States. Surveillance strategies and available data. Review of nutrition programs designed to improve status of high risk populations and methods of evaluation. Prerequisite: course in general nutrition. Offered: 1996; A.

NUTR 532 Fieldwork in Public Health Nutrition (2-12, max. 12) Observation and participation in community agency nutrition programs. Prerequisite: graduate student in nutrition and permission of instructor. Offered: AWSpS.

NUTR 535 Laboratory Methods in Nutrition (3) *LeBoeuf, Rosenfeld* Techniques used in nutrition research. Spectroscopy, isotopes, ultracentrifugation, chromatography; vitamin, lipid, and mineral analysis; methods for animal and human research. Prerequisites: laboratory experience in chemistry, biochemistry. Offered: 1998; Sp.

NUTR 536 Nutrition Education Principles and Practice (3) *Karreck* Integrated course designed to prepare students of the practical application of nutrition education theories and principles in diverse behavioral change settings for a variety of learner-population groups. Prerequisite: permission of instructor. Offered: 1998; Sp.

NUTR 537 Laboratory Rotation (1-4, max. 8) *LeBoeuf, Rosenfeld* Exposure to research being conducted in the laboratories of the graduate nutrition faculty. Provides hands-on experience in laboratory research. Introduces the student to on-going research for preparation of dissertation topics. Prerequisites: 535, permission of graduate adviser. Offered: AWSpS.

NUTR 538 Nutritional Epidemiology (3) *Beresford, Kestin* Application of epidemiology methods to current studies of nutrition and disease. Special methodological problems of importance in nutritional epidemiological studies. Enables students to plan studies in nutritional epidemiology. Prerequisite: EPI 511 or 512 and BIOST 511 or permission of instructors. Offered: jointly with EPI 538; A.

NUTR 539 Seminar in Nutrition (1-3, max. 9) *LeBoeuf, Rosenfeld* Library seminar and research on selected topics in recent developments in the field of nutrition. Prerequisite: advanced nutrition.

NUTR 580 Practicum in Dietetic Education (1-5) *Karreck* Supervised instructional experiences for dietetic education in both classroom and clinical situations. Individually arranged. Offered: AWSpS.

NUTR 561 Advanced Clinical Nutrition Fieldwork (1-3, max. 9) *Adams* Participation in a health-care team assessing nutrition status and needs, designing care plans to optimize nutritional support of patients, and establishing appropriate criteria for the evaluation of the nutrition care provided. Supervised clinical experience provided in a variety of local health-care institutions. Prerequisite: permission of instructor. Offered: AWSpS.

NUTR 562 Advanced Clinical Nutrition I (4) *Karreck* Epidemiology and pathophysiology of acute of chronic disease related to nutrition (e.g., cardiovascular, endocrinologic, and hematologic diseases). Nutritional interventions and their relationship to medical, surgical, and pharmacologic treatment. Prerequisite: diet therapy. Offered: A.

NUTR 563 Advanced Clinical Nutrition II (4) *Karreck* Assessment of the nutritional demands and hypermetabolic response of trauma, surgery, acute and neoplastic disease; determination of the appropriate amounts and sources of nutrients supplied through enteral and/or parenteral routes. Prerequisite: diet therapy. Offered: W.

NUTR 564 Management of Nutrition Services (3) *Karreck* Administrative processes affecting health care, specific focus on management of nutritional support systems. Includes productivity and cost effective-

ness of nutrition care, establishing and achieving quality of health-care professionals and varying health-care systems. For clinical nutritionists working in standard health-care systems. Offered: Sp.

NUTR 565 Seminar in Clinical Nutrition Practice (1-3) *Adams* Selected topics and learning experiences in nutritional care delivery. Prepares students for practical application of nutritional concepts in diverse clinical settings. Prerequisites: concurrent registration in 561 and permission of instructor. Offered: AWSpS.

NUTR 600 Independent Study or Research (*) Offered: AWSpS.

NUTR 700 Master's Thesis (*) Offered: AWSpS.

NUTR 800 Doctoral Dissertation (*) Credit/no credit only. Prerequisite: permission of program adviser. Offered: AWSpS.

Quantitative Ecology and Resource Management

E. David Ford, Graduate Program Coordinator

The graduate program offered by the Quantitative Ecology and Resource Management (QERM) interdisciplinary group provides a unique opportunity for students to study the application of statistical, mathematical, and decision sciences to a broad array of terrestrial and marine ecology, natural resource management, biometrical, and mathematical biology problems. The QERM program of study leads to Master of Science and Doctor of Philosophy degrees, and is designed to attract mathematically trained students interested in working on contemporary ecological or resource management problems from a quantitative perspective.

Faculty associated with this interdisciplinary program come from 13 campus units, including Statistics, Applied Mathematics, Forest Resources, Fisheries, Zoology, Biostatistics, and Marine Affairs. This pool of faculty talent is available to enrich the academic experience of all QERM students.

Degree Requirements

Students entering the QERM program are expected to have either a strong mathematical or biological (ecological) background. Master of Science course work requirements include two courses in statistical theory; one course in optimization; one applied statistical methods course; two courses in either applied quantitative ecology or quantitative resource management; a seminar in quantitative ecology; plus approved electives. All master's degree holders must pass a first-year qualifying examination, prepare and defend a thesis, take a total of at least 45 graded quarter credits, and satisfy all Graduate School requirements.

Students passing the first-year qualifying examination at the Ph.D. level are eligible to enter the doctoral program of study. Course requirements equivalent to the master's program also must be completed. Doctor of Philosophy degree requirements include a minimum of 36 credits of graded course work beyond the master's; a minimum of 27 credits of dissertation research; and satisfaction of all Graduate School requirements. The 36 credits of course work must be taken from an approved list of courses.

Admission Requirements

Students entering this graduate program are expected to perform well on the quantitative and analytical sections of the Graduate Record Examination. Background in a biological or ecological field is also highly desirable. To enter the Ph.D. program, students must pass the first-year qualifying examination at the Ph.D. level. In

addition, all course requirements equivalent to the master's program must be completed. At least three letters of recommendation and a brief narrative statement of objectives must accompany each application for admission. Applications are accepted only for autumn quarter. The application deadline is February 1.

Financial Aid

Fellowships, teaching assistantships, and research assistantships are available each year. These come from either the Graduate School or one of the campus units contributing faculty to the QERM program. They generally cover the nine-month academic year, although provisions can be made for summer support. Tuition is normally included as part of the financial package. Funding decisions are made yearly, but attempts are made to continue support for students making satisfactory progress.

Correspondence and Information

Chair
Quantitative Ecology and Resource Management,
Box 355230
(206) 543-1191
email: qerm@cqs.washington.edu

Faculty

Chair

E. David Ford

Professors

Bare, B. Bruce * 1969; MS, 1965, University of Minnesota; PhD, 1969, Purdue University; harvest scheduling, biometry, forest land management, taxation, finance, management science.

Bassingthwaite, James * 1975; MD, 1955, University of Toronto (Canada); PhD, 1964, Mayo Medical School; computer analysis of transport mechanisms in blood and tissues.

Bell, Earl J. * 1966; PhD, 1965, University of California (Berkeley); operations research, statistics, quantitative methods and geographic information systems.

Briggs, David G. * 1973; PhD, 1980, University of Washington; operations research in forest products industries.

Brown, Gardner * 1965; PhD, 1964, University of California (Berkeley); resource and environmental economics.

Dowdle, Barney * 1962; PhD, 1962, Yale University; markets for timber and forest products, public forest land management.

Faaland, Bruce H. * 1971; PhD, 1971, Stanford University; manufacturing, scheduling, inventory, operations research, mathematical programming, forestry.

Felsenstein, Joseph * 1968; PhD, 1968, University of Chicago; evolution and population genetics.

Ford, E. David * 1985; PhD, 1968, University College, London (UK); forest ecology and ecophysiology, modeling, spatial statistics.

Francis, Robert C. * 1983; PhD, 1970, University of Washington; fishery oceanography, effects of climate on marine ecosystems, paleoecology, fisheries management.

Gallucci, Vincent * 1976; PhD, 1971, North Carolina State University; biomathematics and population dynamics.

Greulich, Francis E. * 1977; PhD, 1976, University of California (Berkeley); forest engineering, statistics, operations research.

Guttorp, Peter * 1980; PhD, 1980, University of California (Berkeley); point processes, stochastic models, applications to hydrology and atmospheric science.

Hilborn, Ray * 1987; PhD, 1974, University of British Columbia (Canada); population dynamics and resource policy.

Johnson, Jay A. * 1983; PhD, 1973, University of Washington; mechanical and physical properties of wood and wood composite materials, wood quality.

Kareiva, Peter M. * 1983; PhD, 1981, Cornell University; theoretical ecology, conservation biology, agricultural ecology, plant-insect interaction.

Kingsolver, Joel * 1986; PhD, 1981, Stanford University; physiological ecology and evolutionary morphology of insects.

Mathews, Stephen B. * 1972; PhD, 1967, University of Washington; quantitative fishery management.

Murray, James D. * 1988; PhD, 1956, DSc, 1968, Oxford University (UK); mathematical biology, biological pattern formation, wound healing, spread of epidemics.

Schreuder, Gerard Fritz * 1971; PhD, 1968, Yale University; statistical analysis in resource economics, international forestry, trade, aerial photos.

Skalski, John R. * 1987; PhD, 1985, Cornell University; environmental sampling and effects assessment on wild populations, parameter estimation.

Swartzman, Gordon Leni * 1973, (Research); PhD, 1969, University of Michigan.

Thompson, Elizabeth A. * 1985; PhD, 1974, Cambridge University (UK); statistical analysis of human genetic data, statistics of conservation and computational biology.

Associate Professors

Anderson, James J. * 1969; PhD, 1977, University of Washington; fisheries and oceanography.

Conquest, Loveday L. * 1988; PhD, 1975, University of Washington; statistics in forestry, fisheries, and environmental pollution monitoring.

Kot, Mark * 1989; PhD, 1987, University of Arizona; mathematical ecology, nonlinear dynamics, and population biology.

Leschine, Thomas M. * 1983; PhD, 1975, University of Pittsburgh; marine pollution management, ocean policy studies.

Pikitch, Ellen * 1987; PhD, 1983, Indiana University; marine fisheries population dynamics, assessment and management.

Rustagi, Krishna P. * 1973; PhD, 1973, Yale University; operations research and statistical applications in resource management, forest inventory.

Sampson, Paul D. * 1981, (Research); PhD, 1979, University of Michigan; spatial statistics and environmental metrics, morphometrics, statistical consulting.

Assistant Professor

Sullivan, Patrick J. 1991; PhD, 1988, University of Washington; biometrics, population dynamics modeling, stock abundance estimation, stochastic growth modeling.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

QERM 600 Independent Study or Research (*)

QERM 700 Master's Thesis (*)

QERM 800 Doctoral Dissertation (*)

Quaternary Research Center

19 Johnson

Quaternary studies focus on the processes that presently shape the natural environment and have operated over approximately the past two and a half million years (Quaternary Period). A knowledge of Quaternary events facilitates an understanding of earth history in relation to the modern environment and has predictive value with regard to present-day and future environmental changes.

Quaternary research is typically interdisciplinary, and thus it commonly involves related interests of two or more academic units. The Quaternary Research Center was established in 1967 to foster such interdisciplinary studies on a cooperative basis.

The Center has as goals: (1) to understand environments and climate changes of the past two and a half million years in the context of modern surface processes, which include historical changes, prehistoric postglacial environments, and Ice Age events; (2) to serve as an effective catalyst in fostering interdisciplinary studies in the fields of atmospheric sciences, archaeology/anthropology, botany, engineering, fisheries, forestry, geology, geophysics, oceanography, pedology, and zoology; (3) to provide a scientific perspective on the scale of modern and man-made environmental changes, including climate changes, in the context of recent earth history; (4) to conduct a curriculum jointly with other disciplines in the training of graduate students in Quaternary-oriented studies; and (5) to seek applications of Quaternary studies to modern environmental problems that will help predict consequences of policy decisions.

Graduate Program

Students associated with the Center obtain their degrees through cooperating departments. Students interested in graduate work at the Center should apply to the department of their choice but plan to do their research in a Quaternary-related subject.

Research Facilities

The research laboratories of the Center provide an array of modern facilities for investigation of Quaternary problems:

Quaternary Isotope Laboratory. The work emphasizes use of carbon and oxygen isotopes to study various aspects of the carbon and hydrological cycles. Major interests include radiocarbon dating, as applied to time-scale calibration and the study of climate change, and studies of polar ice cores.

Periglacial Laboratory. The laboratory contains cold rooms equipped for manipulating and studying the freezing and thawing of soils, rocks, and building materials. A large, unique tilt table permits the study of soils under controlled conditions of slope, temperature, and moisture. Research stress is placed on frost action in arctic and alpine environments.

Quaternary Palynology and Paleoecology Laboratories. These facilities foster studies of the biotic environment through time and of the uses of plant and animal fossils in Quaternary environmental and ecological reconstruction. Studies of vegetational changes are supported by an extensive modern pollen and plant reference collection from Asia and western North America.

QRC Library. This specialized collection, dealing with a wide range of Quaternary topics, is among the most extensive in North America. It includes books, monographs, theses, journals, and maps, and houses a large, diverse reprint collection.

Correspondence and Information

Director
Quaternary Research Center, Box 351360

Faculty

Director

Stephen C. Porter

Professors

Atwater, Brian F. 1986; MS, 1974, Stanford University; PhD, 1980, University of Delaware; paleoseismology, neotectonics, regional geology.

Brubaker, Linda B. * 1973; PhD, 1973, University of Michigan; dendrochronology, forest ecology, quaternary paleoecology.

Dunnell, Robert C. * 1967; PhD, 1967, Yale University; archeological theory, field method, eastern North America.

Emerson, Steven R. * 1976; PhD, 1974, Columbia University; marine geochemistry, chemical oceanography, sediment diagenesis.

Gillespie, Alan R. * 1985, (Research); PhD, 1982, California Institute of Technology; landscape evolution, paleoclimate, geochronology, and applications of remote sensing.

Grayson, Donald K. * 1975; PhD, 1973, University of Oregon; North American prehistory, paleoecology, vertebrate faunal analysis, history of archaeology.

Hallet, Bernard * 1980; PhD, 1975, University of California (Los Angeles); glaciology, permafrost studies, geomorphology.

Hartmann, Dennis L. * 1977; PhD, 1975, Princeton University; climate theory, dynamic meteorology, radiation and remote sensing.

Kohn, Alan J. * 1961; PhD, 1957, Yale University; invertebrate zoology, ecology and functional morphology of marine invertebrates.

Leopold, Estella B. * 1976; PhD, 1955, Yale University; paleoecology, pollen and seed analysis, late Cenozoic environment.

Porter, Stephen C. * 1962; PhD, 1962, Yale University; Quaternary geology and geomorphology.

Quay, Paul D. * 1977; PhD, 1977, Columbia University; chemical oceanography, stable isotope geochemistry, ocean tracers and mixing.

Raymond, Charles F. * 1969; PhD, 1969, California Institute of Technology; glaciology, glacier and ice sheet dynamics.

Richey, Jeffrey E. * 1973; PhD, 1973, University of California (Davis); quantitative problems of aquatic ecosystems, primary Amazon River, limnology.

Stein, Julia K. * 1980; MA, 1976, PhD, 1980, University of Minnesota; New World archaeology, Northwest coast archaeology, geoarchaeology, shell middens.

Stuiver, Minze * 1969; PhD, 1958, University of Groningen (Netherlands); geochronology, isotope geology.

Tsukada, Matsuo * 1969; PhD, 1961, Osaka City University (Japan); interpretation of Quaternary events from palynological and kindred data.

Warren, Stephen G. * 1981; PhD, 1973, Harvard University; atmospheric radiation, climatology, glaciology.

Associate Professors

Anderson, Patricia M. 1994, (Research); MA, 1976, PhD, 1982, Brown University; Quaternary palynology, paleoecology, paleoclimatology.

Eck, Gerald G. * 1974; PhD, 1977, University of California (Berkeley); primate paleontology, especially African Pliocene-Pleistocene monkeys and hominids.

Montgomery, David R. * 1991, (Research); PhD, 1991, University of California (Berkeley); earth surface processes, especially those occurring in mountain drain-age basins.

Shen, Glen T. * 1988; PhD, 1986, Massachusetts Institute of Technology; chemical oceanography, trace element geochemistry, paleoclimate.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

QUAT 417 Quaternary Glacial Ages (3) NW
Porter Physical, biological evidence of climatic change during Quaternary Period, emphasizing stratigraphy and chronology. Impact of alternating glacial/interglacial cycles on earth's terrestrial, marine environments. Use of these data to assess theories on causes of climatic variation. Prerequisite: introductory course in earth science and biological science. Offered: jointly with GEOL 417.

QUAT 501 Seminar/Conference In Quaternary Environments (1, max. 6) Interdisciplinary seminar or conference in the changing natural environments of the Quaternary Period, with emphasis on climatic changes and their effects. Speakers from the University and elsewhere present lectures on their specialties, followed by discussion. Credit/no credit only.

QUAT 502 Interdisciplinary Quaternary Investigations (2, max. 6) Research course for interdisciplinary investigation of Quaternary problems. Student attends sessions of QUAT 501 and pursues a problem-oriented case study concurrently under faculty direction. Required paper on case study. Credit/no credit only. Prerequisite: graduate standing.

QUAT 504 Special Topics In Quaternary Sciences (1-3) Environments and climate changes of past two million years (Quaternary Period) in context of modern surface processes, including historical changes, prehistorical environments of postglacial period, and Ice Age events. Provides scientific perspective on scale of modern and man-made environmental changes, including those of climate, in context of recent earth history. Credit/no credit only. Prerequisites: background courses in earth sciences and ecology.

Urban Design and Planning

Richard Morrill, Director
Gary Pivo, Graduate Program Coordinator

The Interdisciplinary Group for Urban Design and Planning offers the Doctor of Philosophy degree. The program offers a course of study for those seeking to pursue academic or research careers in the public or private sector. The program is concerned with research in urban design and planning and focuses on four areas of concentration: history of urban development, planning, and design; urban form analysis and design; land use planning; and environmental planning. Please write for a more detailed description of these areas of concentration.

The research focus of the program is aimed at achieving a better understanding of cities, of urban regions, city planning and urban design as manifestations of society and culture, and at developing better tools to plan for future physical development. It includes the development of new methods and the application of methods from other disciplines to expand knowledge of urbanization processes. The program stresses the link which exists between urban planning, its legislative context, and the resulting built environment. Objectives of the program are to help students and researchers to master general knowledge, to train them to be scholars and researchers in a particular subject area,

and to guide them in the development of original research. The program of study is divided into three phases.

Phase one provides advanced knowledge in major aspects of planning and design. Included are three doctoral seminars, as well as elective courses from a structured list. Each student must prepare and present a research paper.

Phase two prepares the student in the interdisciplinary content of the field and involves the development of two areas of concentration. These areas must be matched with the interests and experience of faculty on the student's Supervisory Committee. The Supervisory Committee members, most of whom will be from the interdisciplinary group, have primary responsibility for student progress and evaluation. Students are expected to develop knowledge in at least one area outside urban design and planning. Completion of phase two is marked by passage of the General Examination.

Phase three focuses on original work which is presented as a dissertation.

Admission Criteria

Applicants must possess a Master of Urban Planning degree or its equivalent in urban design and practice. Students may be asked to complete appropriate background work. Admission into the program is very limited and is based on evidence of promise for high scholarly achievement. The applicant's statement of purpose, prior course work, GRE examination scores, letters of recommendation, and examples of past written work are all considered. Students may begin the program autumn quarter only.

Financial Aid

A very limited number of fellowships and assistantships are available each year. Tuition is normally included as part of the financial package.

Correspondence and Information

Terry Duffey
Interdisciplinary Programs
The Graduate School, Box 351240
(206) 543-6398
email: tduffey@u.washington.edu

Faculty

Professors

Bell, Earl J. * 1966; PhD, 1965, University of California (Berkeley); operations research, statistics, quantitative methods and geographic information systems.

Beyers, William B. * 1962; PhD, 1967, University of Washington; economic geography, regional analysis, regional development.

Bradley, Gordon A. * 1972; PhD, 1966, University of Michigan; forest land use planning, recreation site planning and design.

Findlay, John M. * 1987; PhD, 1982, University of California (Berkeley); history of the American West.

Gordon, Margaret T. * 1988; PhD, 1972, Northwestern University; news media and public policy; violence against women.

Guest, Avery * 1972; MS, 1964, Columbia University; MA, 1967, PhD, 1970, University of Wisconsin; demography, ecology, stratification.

Hancock, John L. * 1969; PhD, 1964, University of Pennsylvania; urban and planning history, society, planning and environmental policy.

Hershman, Marc * 1976; JD, 1967, Temple University; LL.M., 1970, University of Miami (Florida); coastal zone management law.

Hirschman, Charles * 1987; PhD, 1972, University of Wisconsin; demography, race and ethnic relations, social stratification, Southeast Asia.

Hodge, David C. * 1975; MS, 1973, PhD, 1975, Pennsylvania State University; urban geography, urban transportation geography, equity, gender.

Krumme, Günter * 1970; PhD, 1966, University of Washington; economic, organizational and marketing geography, location theory, regional development.

Lee, Robert G. * 1978; PhD, 1973, University of California (Berkeley); natural resource sociology, multiresource management, development/change of forestry institutions.

Mar, Brian W. * 1967; PhD, 1958, University of Washington; system engineering, environmental management, interdisciplinary management.

May, Peter J. * 1979; PhD, 1979, University of California (Berkeley); policy analysis, quantitative methods, federal disaster policy.

Miller, Donald H. * 1970; PhD, 1972, University of California (Berkeley); land use and urban spatial structure, data analysis and forecasting, planning theory.

Morrill, Richard L. * 1955; PhD, 1959, University of Washington; spatial organization, migration, population, diffusion, regional planning/development, inequality.

Olson, David J. * 1974; PhD, 1971, University of Wisconsin; American government and politics (urban, state, and labor relations).

Rutherford, G. Scott * 1981; PhD, 1974, Northwestern University; transportation planning and engineering.

Schneider, Jerry * 1967; PhD, 1966, University of Pennsylvania; metropolitan area and regional planning, transportation and other urban models.

Spain, David H. * 1968; PhD, 1969, Northwestern University; psychocultural anthropology, African studies, research methods.

Streatfield, David C. * 1974; MLA, 1965, University of Pennsylvania; regional landscape planning; landscape, architectural and environmental history.

Untermann, Richard K. * 1971; MLA, 1967, Harvard University; urban design and site planning, housing, recreation, nonmotorized circulation.

Vernez Moudon, Anne * 1980; DSc, 1987, Ecole Polytechnique Federale de Lausanne (Switzerland); urban design, city form and neighborhood studies, design research.

White, Richard * 1990; PhD, 1975, University of Washington; American West, American Indian, environmental history.

Zerbe, Richard O. * 1975; PhD, 1969, Duke University; law and economics, cost-benefit analysis, economic history, environmental regulation.

Associate Professors

Chrisman, Nicholas R. * 1987; PhD, 1982, University of Bristol (UK); geographic information systems, spatial error analysis.

Dubrow, Gail Lee * 1989; MA, 1979, University of Oregon; PhD, 1991, University of California (Los Angeles).

Horner, Richard R. * 1981, (Research); PhD, 1978, University of Washington; wetlands, conservation and storm water management.

Nyerges, Timothy L. * 1985; PhD, 1980, Ohio State University; GIS, spatial decision support, urban, transportation, environment, groupware.

Pivo, Gary E. * 1987; PhD, 1987, University of California (Berkeley); land use and physical planning, environmental planning, growth management.

Sommers, Paul E. * 1985, (Research); PhD, 1978, Yale University; economic development policy, regional economics.

Interschool or Intercollege Programs

Bioengineering

309 Harris Hydraulics Laboratory

The Center for Bioengineering provides a comprehensive, multidisciplinary program of education and research. The concepts and techniques of engineering are applied to the challenges in biology and medicine. Major areas of current bioengineering research include bioinstrumentation, biomaterials, biomechanics, controlled drug-release systems, imaging, micro-sensors, bioelectromagnetics, molecular bioengineering, microcirculation, cell mechanics, muscle, and simulation of biosystems.

Undergraduate Program

The undergraduate bioengineering program at the University of Washington is an honors program tailored for students bound for an M.D.-Ph.D. degree with a Ph.D. component in bioengineering. It is designed to bridge the gap in emphasis and curriculum that has traditionally alienated students in biology and in engineering. The curriculum leads to a B.S.E., and consists of a blend of engineering and biological sciences that provides students with unusual opportunities and qualifications for a future biomedical-bioengineering research career. This program is administered by the Center for Bioengineering via the Interdisciplinary Engineering Studies Program of the College of Engineering. Admission is restricted to a small number of highly motivated individuals with an outstanding track record of academic performance. Applicants must have completed at least one year of pre-engineering course work with a minimum GPA of 3.50.

Graduate Program

The Center for Bioengineering offers programs of study which lead to the Master of Science (M.S.), Master of Science in Engineering (M.S.E.), and Doctor of Philosophy (Ph.D.) degrees.

Master of Science

The Master of Science degree program provides essential training in the engineering sciences, which aids students with strong backgrounds in the biological sciences to prepare for careers in research and development in either basic medical sciences or clinical investigations. A thesis is required.

Master of Science in Engineering

The Master of Science in Engineering degree program provides essential training in the life sciences that assists students with sound engineering backgrounds to prepare for careers in academic, industrial, or hospital environments. A thesis is required.

Doctor of Philosophy

The objective of the Ph.D. program is to train individuals for careers in bioengineering research and teaching. The training has three major components: (1) acquisition of a breadth of knowledge about engineering, biology, and medicine and the interdisciplinary interface between these quite disparate fields; (2) de-

velopment of a depth of knowledge and expertise in a particular scientific specialty; (3) development of a potential for independent research that can be demonstrated. The objectives are fulfilled through use of a combination of research and teaching experiences. The program is designed to be rigorous while maintaining sufficient flexibility to accommodate qualified students with diverse backgrounds. Entrance to the Ph.D. program may be made directly after the B.S. or following completion of the M.S. or M.S.E.

Medical Scientist Program

A Medical Scientist Program exists for the support of individuals interested in coordinated graduate school-medical school study leading to both the M.D. and Ph.D. degrees. Students entering this highly competitive program are given an opportunity to pursue a flexible, combined course of study and research. Early inquiry regarding this program is urged since admission to the Graduate School and to the School of Medicine must be secured independently.

Research Facilities

Offices and laboratories are located in the College of Engineering and the School of Medicine. Students have access to the University of Washington Medical Center, Vivarium, Primate Center, Computer Center, and libraries, as well as to all engineering and health sciences departments and facilities. A wide range of technologies and virtually all aspects of biomedical science are available. Cellular and molecular bioengineering are strong components of the research programs of the center. State-of-the-art facilities are available to support both research and instructional activities. Computer resources are especially abundant, and their use is an integral part of most laboratory and course work.

Admission Requirements

Applicants for the M.S. degree should have a baccalaureate degree in a science or the equivalent; applicants for the M.S.E. degree should have a baccalaureate degree in engineering or the equivalent. Preparation for both programs must include, at a minimum, one year each of calculus, physics, and chemistry. Applicants to the Ph.D. program should have strong academic credentials, a bachelor's degree in science or engineering, and demonstrated potential for advanced study. Admission to the program is highly selective.

In addition to completing the application requirements for the Graduate School, an applicant should also forward the following items to the Academic Counselor, Center for Bioengineering, Box 357962, University of Washington, Seattle, WA 98195: (1) a one- or two-page written statement outlining academic and professional goals; (2) official copies of Graduate Record Examination scores for the general tests; (3) three letters of recommendation from persons acquainted with the applicant's background; and (4) a departmental information form.

Financial Aid

Financial aid is available to qualified graduate students in the form of traineeships, fellowships, and assistantships. Funding is derived from federal research and training programs, the Graduate School Research Fund, and programs sponsored by private agencies. Information concerning these fellowships is available from the Center for Bioengineering.

Faculty

Director

Lee L. Huntsman

Professors

Fromowitz, Martin * 1975, (Adjunct); PhD, 1969, Columbia University; microtechnology, solid-state and fiber-optics sensors, biomedical instrumentation.

Auth, David C. * 1969, (Affiliate); PhD, 1969, Georgetown University; lasers and electro-optical system design, electrophysics, medical instrumentation.

Bashein, Gerard * 1974, (Adjunct); PhD, 1969, Carnegie-Mellon University; MD, 1974, University of New Mexico.

Bassingthwaite, James * 1975; MD, 1955, University of Toronto (Canada); PhD, 1964, Mayo Medical School; computer analysis of transport mechanisms in blood and tissues.

Beach, Kirk Watson * 1976, (Adjunct Research); MSChE, 1968, PhD, 1971, University of California (Berkeley); MD, 1976, University of Washington; arterial disease in diabetes, blood flow studies with ultrasonic Doppler.

Bruckner, Adam * 1972, (Adjunct); PhD, 1972, Princeton University; space propulsion, power, and systems design; hypersonic, hypervelocity accelerators; lasers.

Caldwell, James H. 1978, (Adjunct); MD, 1970, University of Missouri; cardiology.

Callis, James B. * 1973, (Adjunct); PhD, 1970, University of Washington; instrumentation development, process analytical chemistry, non-invasive clinical chemistry.

Crum, Lawrence A. * 1992, (Research); PhD, 1967, Ohio University.

Daly, Colin H. * 1967, (Adjunct); PhD, 1966, University of Strathclyde (UK); bioengineering, materials.

Foster, David M. * 1980, (Research); PhD, 1969, University of British Columbia (Canada).

Graham, Michael M. * 1980, (Adjunct); PhD, 1973, University of California (Berkeley); MD, 1976, University of California (San Francisco); positron emission tomography, nuclear medicine.

Guy, Arthur W. * 1955, (Emeritus); PhD, 1966, University of Washington; biological effects and medical applications of electromagnetic fields.

Haralick, Robert M. * 1986, (Adjunct); PhD, 1969, University of Kansas; computer vision, artificial intelligence, pattern recognition, image processing.

Hlastala, Michael P. * 1972, (Adjunct); PhD, 1969, State University of New York (Buffalo); respiratory physiology, inert gas analysis of respiratory function.

Hoffman, Allan S. * 1970; DSc, 1957, Massachusetts Institute of Technology; polymer materials science and engineering.

Hood, Leroy E. * 1992; PhD, 1968, California Institute of Technology; molecular immunology, large-scale DNA mapping and sequencing, molecular evolution.

Horbett, Thomas A. * 1973; PhD, 1970, University of Washington; interfacial proteins, cell interactions, insulin delivery systems.

Huntsman, Lee L. * 1968; PhD, 1968, University of Pennsylvania; mechanics of heart and heart muscle, cardiovascular system assessment, new measurement techniques.

Johnson, Dale E. * 1976; MS, 1967, PhD, 1971, University of Chicago; elemental microanalysis of biological systems, electron energy loss spectrometry.

Kim, Yongmin * 1982, (Adjunct); PhD, 1982, University of Wisconsin; computer architecture, imaging systems, computer graphics, multimedia, modeling and instrumentation.

Kushmerick, Martin J. * 1988; MD, 1963, PhD, 1966, University of Pennsylvania; muscle contraction, magnetic resonance, metabolic imaging NMR spectroscopy.

Lewellen, Thomas * 1975, (Adjunct); PhD, 1972, University of Washington; bioengineering, electrical engineering.

Martin, Roy W. * 1971, (Research); PhD, 1975, University of Washington; bioinstrumentation, ultrasonic Doppler, echo, tissue characterization, signal processing.

Matsen, Frederick A. * 1973, (Adjunct); MD, 1968, Baylor University; orthopaedics, bone and joint research, robotics.

Nelson, James A. * 1986, (Adjunct); MD, 1965, Harvard University; diagnostic radiology with basic research in related sciences.

Pollack, Gerald H. * 1968; PhD, 1968, University of Pennsylvania; muscular contraction.

Ratner, Buddy D. * 1972; PhD, 1972, Polytechnic Institute of Brooklyn; synthesis and characterization of polymeric biomaterials.

Rushmer, Robert F. * 1947, (Emeritus); MD, 1939, University of Chicago; health care delivery systems, technology transfer.

Schwartz, Stephen Mark * 1974, (Adjunct); MD, 1967, Boston University; PhD, 1973, University of Washington; vascular biology, atherosclerosis, molecular basis of lineage, developmental biology, cell kinetics.

Soma, Mani * 1982, (Adjunct); PhD, 1980, Stanford University; IC design and testing, mixed signal testing, bioengineering.

Spelman, Francis A. * 1961; PhD, 1975, University of Washington; biophysics of implanted cochlea, bioinstrumentation for primate research.

Trask, Barbara J. * 1992, (Adjunct Research); PhD, 1985, University of Leiden (Netherlands); in situ hybridization, analytical cytogenetics, analysis of large-scale DNA polymorphism.

Verdugo, Pedro * 1974; MD, 1965, State University of Chile; microrheology, biomechanics, polymer gel physics, laser spectroscopy, cell biology.

Yager, Paul * 1987; PhD, 1980, University of Oregon; physical chemistry and applications of biomembranes.

Associate Professors

Conley, Kevin E. 1988, (Adjunct); PhD, 1983, University of Wisconsin; muscle physiology.

Dager, Stephen R. 1979, (Adjunct); MD, 1978, University of Nebraska.

Hannaford, Blake * 1989, (Adjunct); PhD, 1985, University of California (Berkeley); human and robotic movement control, bioengineering, controls, human-machine interaction.

Kalet, Ira J. * 1980, (Adjunct); PhD, 1968, Princeton University; computer simulation of radiation therapy, artificial intelligence, computer graphics.

Kroll, Keith * 1987, (Research); PhD, 1983, University of Washington; regulation of energy balance in the heart.

Linker, David T. 1993, (Adjunct); MD, 1976, Stanford University; cardiology.

Nelson, Alan C. * 1986, (Affiliate); PhD, 1980, University of California (Berkeley); biomedical imaging using image analysis for tissue and tumor studies.

Richards, Todd L. * 1985, (Adjunct); PhD, 1984, University of California (Berkeley); nuclear magnetic resonance imaging, spectroscopy of the brain in demyelinating diseases.

Riskin, Eve A. * 1990, (Adjunct); PhD, 1990, Stanford University; image compression and processing, and signal processing.

Rowberg, Alan H. * 1982, (Adjunct); MD, 1970, University of Washington.

Stewart, Brent K. * 1993, (Adjunct); PhD, 1988, University of California (Los Angeles); physics.

Tencer, Allan Fred * 1988, (Adjunct); PhD, 1981, McGill University (Canada).

Viney, Christopher * 1987, (Affiliate); PhD, 1983, Cambridge University (UK); phase transformations and microstructure/property relationships in polymers and liquid crystals.

Assistant Professors

Baker, David * 1993, (Adjunct); PhD, 1989, University of California (Berkeley); protein folding.

Baneyx, Francois * 1992, (Adjunct); PhD, 1991, University of Texas (Austin); biotechnology, protein technology, biochemical engineering.

Hunkapiller, Tim * 1992, (Adjunct Research); PhD, 1992, California Institute of Technology; biological computation and genomic methodologies and analysis.

Kunzelman, Karyn S. * 1991, (Adjunct Research); PhD, 1991, University of Texas (Dallas); biomedical engineering - cardiac; anatomy and physiology.

Lybrand, Terry Paul * 1990; PhD, 1984, University of California (San Francisco); molecular modeling, computer simulation of biomacromolecules, development of simulation analysis.

Nickerson, Deborah A. * 1992, (Adjunct); PhD, 1978, University of Tennessee; automating the identification and typing of human DNA variations, genetic mapping, DNA diagnostics.

Pagliari, Leonard J. * 1991; PhD, 1986, Wesleyan University; in vivo enzymology, cytoplasmic organization, light microscopy, image processing, photobleaching.

Ramon, Ceon * 1989, (Research); PhD, 1973, University of Utah; biomagnetic imaging and its application to detect cardiac dysrhythmia problems.

Sanders, Joan Elizabeth * 1993; PhD, 1991, University of Washington; soft tissue biomechanics and tissue adaptation to mechanical stress.

Stayton, Patrick S. * 1992; PhD, 1989, University of Illinois; engineering proteins for biotechnology, biomaterials, and biomedical therapies/diagnostics.

Vogel, Viola * 1990; PhD, 1987, Johann Wolfgang Goethe University (Germany); molecular assemblies and Langmuir-Blodgett films, liquid interfaces, nonlinear optics, microscopy.

Yates, John R. III * 1992, (Adjunct); PhD, 1987, University of Virginia; biological mass spectrometry, protein sequencing, computational methods for data analysis.

Yuan, Chun 1991, (Adjunct); PhD, 1988, University of Utah; medical biophysics, MRI.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

BIOEN 299 Introduction to Bioengineering (1) *Verdugo* Lectures on the various aspects of bioengineering; orientation in bioengineering studies and practice. Credit/no credit only. Offered: Asp.

BIOEN 436 Medical Instrumentation (4) *Spelman* Introduction to the application of instrumentation to medicine. Topics include transducers, signal-conditioning amplifiers, electrodes and electrochemistry, ultrasound systems, electrical safety, and the design of clinical electronics. Laboratory included. For juniors, seniors, and first-year graduate students who are preparing for careers in bioengineering, both research and industrial. Prerequisite: some knowledge of human physiology and electronics or instrumentation or permission of instructor. Recommended: 534, 535, E E 433. Offered: jointly with E E 436; Sp.

BIOEN 450 Molecular Biology for Engineers I (4) *Medina* Basic foundation in DNA biochemistry, de-

scription of molecular processes within the eucaryotic nucleus, and basic techniques in molecular biology.

BIOEN 451 Molecular Biology for Engineers II (4) *Medina* Utilization of recombinant DNA technology in research disciplines, including medicine, agriculture, forensics, anthropology, and embryology. Discussion of future research directions and increasing role of bioethics in the research community. Prerequisite: 450 or permission of instructor. Offered: AW.

BIOEN 467 Biochemical Engineering (3) *Baneyx* Application of basic chemical engineering principles to biochemical and biological process industries such as fermentation, enzyme technology, and biological waste treatment. Rapid overview of relevant microbiology, biochemistry, and molecular genetics. Design and analysis of biological reactors and product recovery operations. Prerequisite: CHEM E 340, organic chemistry. Recommended: CHEM E 465. Offered: jointly with CHEM E 467; W.

BIOEN 490 Engineering Materials for Biomedical Applications (3) *Hoffman* Combined application of principles of physical chemistry, biochemistry, materials engineering, mass transfer, and fluid mechanics to biomedical problems. Case studies include considerations of selection of materials, design, and operation of instruments, components of, or entire, artificial organs and artificial structural elements, all for use in contact with body fluids. Prerequisite: organic chemistry or permission of instructor. Offered: jointly with CHEM E 490; even years; W.

BIOEN 491 Controlled-Release Systems: Principles and Applications (3) *Hoffman* Mechanisms for controlled release of active agents and the development of useful systems for this purpose. Release mechanisms include diffusive, convective, or erosive driving forces. Applications to the biomedical, agricultural, forestry, and oceanography fields. Some special case studies covered in detail. Prerequisite: permission of instructor. Offered: jointly with CHEM E 491; odd years; W.

BIOEN 492 Surface Analysis (3) *Ratner* Understanding of solid surfaces for research and development in microelectronics, catalysis, adhesion, biomaterials, science wear, and corrosion science. Newer methods available to study surfaces of materials. Electron emission spectroscopy (ESCA, Auger); ion scattering, ion spectroscopic, photon spectroscopic, and thermodynamic methods. Offered: jointly with CHEM E 458; W.

BIOEN 499 Special Projects (2-6) Individual undergraduate bioengineering projects under the supervision of an instructor. In addition, classes on selected topics of current interests as announced. Prerequisite: permission of instructor. Entry Code required. Offered: AWPSP.

Courses for Graduates Only

BIOEN 508 Physical Aspects of Medical Imaging (4) *Stewart* Quantitative physical principles of medical imaging are presented for electromagnetic and sonic radiation. Methods of image formation and analysis are discussed for conventional film radiography, CT, DSA, PET, B-mode ultrasound and Doppler ultrasound. Offered: jointly with RADGY 508; Sp.

BIOEN 510- Bioengineering Seminars (1-2), max. 3) Topics of current bioengineering interests presented by resident and visiting faculty members and students. Graduate students actively involved in bioengineering research are eligible to enroll for credit and can be expected to attend regularly, participate in discussions, and make presentations. Credit/no credit only. Offered: AW.

BIOEN 511 Biomaterials Seminar (1) *Hoffman, Horbett, Ratner* Presentation of student research results. Credit/no credit only. Prerequisite: permission of instructor. Offered: jointly with CHEM E 511; AWPSP.

BIOEN 512 Biomechanics Seminar (1) *Sanders* Designed to expose students to current research topics in the area of biomechanics and permit them the opportunity to present their work for discussion. Subjects include presentations of on-going laboratory research, as well as related topics, journal article review, and summaries of national meetings. Credit/no credit only.

BIOEN 513 Cellular Bioengineering Seminar (1) *Pollack* Presentation of student research results. Credit/no credit only. Prerequisite: permission of instructor.

BIOEN 515 Introduction to Clinical Medicine for Engineers (3) Introduction to concepts and methods used in clinical medicine for students with engineering and physical science backgrounds. How and where engineering principles and methodologies can be applied to health-care problems. Prerequisite: basic physiology or permission of instructor. Offered: odd years; W.

BIOEN 516 Measurement and Confirmation: An Introduction to Philosophical and Ethical Issues for Scientists (2) *Pagliari* Graduate level introduction to philosophical foundations of science and engineering. Methods used to measure and confirm phenomena in research examined, and principles of hypothesis, prediction, testing, experimental design, data acquisition, data recording, data analysis, data presentation, statistics in research, and interpretation of results discussed. Prerequisite: permission of instructor.

BIOEN 520 Orthopedic Biomechanics (4) *Tencer* Mechanical engineering applied to musculoskeletal system with emphasis on techniques in orthopedic surgery. Measurement of mechanical properties of tissues, mechanics of bone, soft tissue, and muscle, mechanics of upper extremity, spine, and lower extremity. Engineering in surgery, gait analysis, joint replacement, fracture fixation. Prerequisite: M E 556 and 557 or permission of instructor. Offered: odd years; W.

BIOEN 534 Introduction to Biomedical Instrumentation: Analog (4) *Spelman* Techniques of biological systems analysis using Fourier and Laplace transforms. Electronic circuit analysis techniques applied to biological problems. Operational amplifiers as interfaces to transducers and as signal processors. Computer-aided design used in both homework and weekly laboratory. Prerequisites: MATH 307, PHYS 121-123, or equivalents. Offered: A.

BIOEN 535 Introduction to Biomedical Instrumentation: Digital (4) *Detmer* Instrumentation systems (power supplies, transducers, amplifiers, recording and display devices); techniques of signal/noise enhancement (grounding, shielding, averaging); digital logic and instrumentation; A/D and D/A conversion; use of laboratory computers and laboratory experience in these areas. Biomedical applications. Prerequisite: permission of instructor. Offered: W.

BIOEN 537 Case Studies in Biomedical Instrumentation (3) *Spelman* Current applications of medical instrumentation to neural prosthesis, microscopy, and the interaction of electromagnetic fields with biological tissues. Prerequisites: 436, 534, and 535 or permission of instructor. Offered: W.

BIOEN 540 Problem Solving in Bioengineering (3) *Foster* Introduction to techniques of mathematical modeling. How to use computer methods to solve selected bioengineering problems in data analysis and modeling, and use models to test hypotheses. Hands-on computer experience. Prerequisite: permission of instructor.

BIOEN 542 Computer Simulation in Biology (3) *Kroll, Bassingthwaite, Graham* Introduction to mathematical modeling of biological phenomena. Tutorial text explains how to derive equations for simple models and apply them to generate simulation data. Application topics include kinetics of biomolecular re-

actions and enzyme saturation, membrane transport, organismal predation, competition and growth, compartmental and spatially distributed models, physiological control systems, probabilistic models. Prerequisite: P BIO 405 and 406 or equivalent or permission of instructor. Offered: W.

BIOEN 545 Fractals in Biology and Medicine (3) *Bassingthwaite* Introduction to fractal and chaos. Conceptual approaches to using fractals for characterizing structures and growth processes, describing heterogeneities, and evaluating properties of tissues. The behavior of non-linear systems, often chaotic, describes physiological homeodynamics, regulation without set points in feedback control. Offered: A.

BIOEN 550 Mass Transport and Exchange in Biological Systems (3) *Bassingthwaite* Review of basic mechanisms of transport; transport through vascular system and blood-tissue exchange processes in organs; integrated system analysis of closed systems and applications to physiological regulation, medical imaging, and pharmacokinetics. Prerequisites: calculus, introduction to differential equations; cardiovascular physiology; E E network analysis or systems analysis, chemical engineering transport. Offered: W.

BIOEN 555 Introduction to Biomechanics (3) *Pollack* Mechanical properties of biological tissues, with emphasis on the underlying histological bases. Bones, joints, cartilage, blood vessels, connective tissue, muscle, heart. Many laboratory sessions. Offered: odd years; Sp.

BIOEN 560 Ultrasound in Bioengineering (4) *Martin* Fundamentals of ultrasonic generation, formation, reception, and treatment of absorption, scattering, and transmission. Conventional and new methodology. (A, B, T-M mode, imaging, Doppler, tissue characterization, and nonlinear effects.) Prerequisite: M E 525 or E E 525 for nonbioengineering students or permission of instructor. Offered: odd years; A.

BIOEN 562 Bioelectromagnetics (4) *Ramon* Interaction of radio-frequency electromagnetic fields with biological systems: history, quantities and units, theoretical analysis, instrumentation and measurements, biological effects, medical applications, including cancer detection and therapy, major energy sources, public controversies, public and occupational health protection, international and national safety standards. Prerequisite: E E 381, or permission of instructor.

BIOEN 563 Mathematical Foundations of Tomography Image Reconstruction (3) *Ramon* Exploration of mathematical foundations of image reconstruction from most basic theorems to today's complex implementations. Material developed in an historical fashion from signal processing in one dimension to filtered back-projection in various geometries for non-diffracting media. Prerequisites: differential equations, advanced calculus, matrices, and modern physics or permission of instructor.

BIOEN 564 Biomedical Light Microscopy and Imaging (4) *Pagliari* Introduction to light microscopy for biomedical applications, presented at the graduate level for students with some background in optics, physics, and biology. Topics include the principles of image formation, contrast, magnification and resolution, practical aspects of microscopy, introduction to microscope imaging, and three-dimensional microscopy. Prerequisite: 534 or permission of instructors. Offered: odd years; Sp.

BIOEN 565 Nuclear Magnetic Resonance in Biomedicine (2) *Hayes, Kushmerick, Richards, Yuan* Basic physics of nuclear magnetic resonance (NMR) imaging and spectroscopy are presented. Research applications of NMR in physiology and biochemistry are reviewed with emphasis on the brain. Grade based on written tests and small research paper. Prerequisite: permission of instructor. Offered: jointly with RADGY 550; odd years; W.

BIOEN 568 Image-Processing Computer Systems (4) *Haralick, Kim* Components of digital processing computer systems. Two-dimensional filtering and optimal filter design as well as basic image-processing operations. Selected advanced image-processing topics introduced. Individual student project. Prerequisite: permission of instructor. Offered: jointly with E E 568; W.

BIOEN 571 Polymeric Materials (3) *Ratner* Relationships between configuration, conformation, molecular order, microstructure, properties of polymeric materials. Concepts relevant to tailoring polymer molecules and microstructures for specific applications. Interactions between polymers and their in-service environment. Characterization and processing techniques relevant to polymeric materials. Prerequisite: one semester or two quarters of organic chemistry. Offered: jointly with MSE 571; odd years; A.

BIOEN 573 Biosensors and Biomedical Sensing (3) *Yager* In-depth overview of the principal types of biosensors. Topics include: how biological molecules are used in sensing, how the sensors operate, how different sensors compare, under what circumstances sensors can be useful, and the applicability of sensors to biomedical sensing. Prerequisite: 436 or 534 and 535 or permission of instructor. Offered: even years; A.

BIOEN 575 Molecular Modeling Methods (4) *Lybrand* Introduction to theory and practice of computer simulation studies of molecules with emphasis on applications to biological molecules and complexes. Discussion of background theory, implementation details, capabilities and practical limitations of these methods. Laboratory sessions, hands-on tutorials, projects. Prerequisite: previous coursework in biochemistry and physical chemistry and/or permission of instructor. Offered: W.

BIOEN 576 Laboratory Techniques in Protein Engineering (4) *Stayton* Practical introduction to fundamentals of recombinant DNA technology and protein engineering. Gene design, bacterial molecular biology, genetic engineering strategy. Laboratory project focused on making site-directed protein mutations. Techniques include the Polymerase Chain Reaction, DNA sequencing, DNA cutting/splicing, protein expression. Prerequisite: background in biochemistry or molecular biology or consent of instructor. Offered: W.

BIOEN 577 Cell and Protein Reaction with Foreign Materials (3) Study of ways in which cell and protein interactions with foreign materials affect the biocompatibility of biomaterials. Description of the phenomenology and mechanisms of protein adsorption, mammalian cell adhesion, and cell receptor biology and of methods used to study these phenomena. Surface properties of materials discussed in context of the course. Prerequisite: permission of instructor.

BIOEN 590 Advanced Topics in Biomaterials (3) *Ratner, Hoffman, Horbett, Yager* Major, controversial issues in application of synthetic materials to medical problems. Blood compatibility, bioadhesion, intraocular lenses, contact lenses, polyurethanes, biodegradation, protein adsorption, corrosion, bone fixation, new materials, artificial heart, medical device regulation. Prerequisite: 490 or CHEM E 490. Offered: jointly with CHEM E 590; even years; Sp.

BIOEN 592 Surface Analysis (3) *Ratner* Understanding of solid surfaces for research and development in microelectronics, catalysis, adhesion, biomaterials science, wear and corrosion science. Newer methods available to study surfaces of materials. Electron emission spectroscopies (ESCA, Auger); ion scattering, ion spectroscopic, photon spectroscopic, and thermodynamic methods. Offered: jointly with CHEM E 558; W.

BIOEN 599 Special Topics in Bioengineering (1-6, max. 15) Offered at a graduate level periodically by faculty members within the Center for Bioengineering;

concerns areas of research activities with current and topical interest to bioengineers. Prerequisites: undergraduate or graduate courses (or equivalent) determined individually for each special topic. Offered: AWSpS.

BIOEN 600 Independent Study or Research (*) Credit/no credit only. Offered: AWSpS.

BIOEN 700 Master's Thesis (*) Credit/no credit only. Offered: AWSpS.

BIOEN 800 Doctoral Dissertation (*) Credit/no credit only. Offered: AWSpS.

Quantitative Science

The Center for Quantitative Science in Forestry, Fisheries, and Wildlife is an intercollege academic unit sponsored by the College of Forest Resources and the School of Fisheries of the College of Ocean and Fishery Sciences. The Center offers a comprehensive program of study in mathematical and statistical methods as applied to problems in ecology and natural resource management. The faculty of the Center includes members of the College of Forest Resources and the School of Fisheries, and many are also adjunct members of the Departments of Biostatistics and Statistics.

Faculty

Professors

Bare, B. Bruce * 1969; MS, 1965, University of Minnesota; PhD, 1969, Purdue University; harvest scheduling, biometry, forest land management, taxation, finance, management science.

Bevan, Donald E. * 1947, (Emeritus); PhD, 1959, University of Washington; biometrics, salmon and the Columbia River.

Briggs, David G. * 1973; PhD, 1980, University of Washington; operations research in forest products industries.

Chapman, Douglas G. * 1949, (Emeritus); PhD, 1949, University of California (Berkeley); population dynamics and enumeration.

Dowdle, Barney * 1962; PhD, 1962, Yale University; markets for timber and forest products, public forest land management.

Ford, E. David * 1985; PhD, 1968, University College, London (UK); forest ecology and ecophysiology, modeling, spatial statistics.

Francis, Robert C. * 1983; PhD, 1970, University of Washington; fishery oceanography, effects of climate on marine ecosystems, paleoecology, fisheries management.

Gallucci, Vincent * 1976; PhD, 1971, North Carolina State University; biomathematics and population dynamics.

Greulich, Francis E. * 1977; PhD, 1976, University of California (Berkeley); forest engineering, statistics, operations research.

Hilborn, Ray * 1987; PhD, 1974, University of British Columbia (Canada); population dynamics and resource policy.

Johnson, Jay A. * 1983; PhD, 1973, University of Washington; mechanical and physical properties of wood and wood composite materials, wood quality.

Mathews, Stephen B. * 1972; PhD, 1967, University of Washington; quantitative fishery management.

Pickford, Stewart G. * 1976; PhD, 1972, University of Washington; forest fire science, wildland fire management.

Schreuder, Gerard Fritz * 1971; PhD, 1968, Yale University; statistical analysis in resource economics, international forestry, trade, aerial photos.

Skalski, John R. * 1987; PhD, 1985, Cornell University; environmental sampling and effects assessment on wild populations, parameter estimation.

Swartzman, Gordon Leni * 1973, (Research); PhD, 1969, University of Michigan.

Associate Professors

Anderson, James J. * 1969; PhD, 1977, University of Washington; fisheries and oceanography.

Conquest, Loveday L. * 1988; PhD, 1975, University of Washington; statistics in forestry, fisheries, and environmental pollution monitoring.

Pikitch, Ellen * 1987; PhD, 1983, Indiana University; marine fisheries population dynamics, assessment and management.

Rustagi, Krishna P. * 1973; PhD, 1973, Yale University; operations research and statistical applications in resource management, forest inventory.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

Q SCI 291, 292 Analysis for Biologists (5, 5) NW, QSR Differentiation; integration, including multiple integrals and partial derivatives. Numerical and computing techniques in analysis. Emphasis on biological problems, particularly in ecology. Prerequisites: MATH 120 for 291; 291 or MATH 124 for 292. Offered: AW, WSp.

Q SCI 381 Introduction to Probability and Statistics (5) NW, QSR Elementary concepts of probability and statistical inference. Sample space, set theory, random variables, expectations, variances, covariance; binomial, normal, hypergeometric, Poisson, chi square, "t" and "F" distributions. Point and confidence interval estimation, basic concepts of hypothesis testing; applications to biological problems. Prerequisite: MATH 120 or equivalent. Offered: AWSpS.

Q SCI 392 Techniques of Applied Mathematics in Biology I (3) NW Ordinary differential equations—linear and nonlinear; systems of differential equations; approximation techniques, numerical solution techniques; applications to biological processes. Prerequisite: 292 or MATH 126, or permission of instructor.

Q SCI 393 Techniques of Applied Mathematics in Biology II (3) NW Applications of advanced ordinary differential equations, special functions, and partial differential equations to descriptions of biological phenomena. Particular emphasis on transport in biological systems, including diffusion and fluid flow. Prerequisite: 392 or permission of instructor.

Q SCI 456 Fundamentals of Fish Population Dynamics and Management (4) NW Pikitch Conveys fundamental concepts of fish population dynamics and fishery management within concept of real-world fisheries problems. Lectures discuss notation, terminology, mathematical models, fisheries principles, and case studies. Laboratory time devoted to practical applications, problems. Prerequisites: 291 and 292, or MATH 124 and 125, or equivalent. Offered: jointly with FISH 456.

Q SCI 457 Methods of Abundance Estimation (4) NW Gunderson, Mathews Methods of estimating fish abundance by direct sampling and indirectly from tagging, catch, and effort analysis. Confidence limits and bias adjustments. Design of marine fishery surveys using statistical sampling principles. Laboratory work with real fishery data and data collected during trawl sampling survey. Prerequisites: 291, 292, 381, and 456 or equivalent. Offered: jointly with FISH 457.

Q SCI 458 Fisheries Stock Assessment (4) NW Hilborn Emphasizes quantitative analysis of fisheries data to determine how the fishery would respond to alternative management actions. Major topics include production models, stocks and recruitment, catch at age analysis, and formulation of harvest strategies. Prerequisite: 456 or permission of instructor. Offered: jointly with FISH 458.

Q SCI 477 Quantitative Wildlife Assessment (5) NW Skalski Focuses on wildlife sampling techniques for estimating animal abundance, home range, and survival rates in terrestrial populations. The design of wildlife investigations for the purposes of impact assessment, research, and resource management is integrated with estimation schemes and demographic models in a quantitative framework. Prerequisites: 291, 292, 482.

Q SCI 480 Sampling Theory for Biologists (3) NW Gallucci, Rustagi Theory and applications of sampling finite populations including: simple random sampling, stratified random sampling, ratio estimates, regression estimates, systematic sampling, cluster sampling, sample size determinations, applications in fisheries and forestry. Other topics include sampling plant and animal populations, sampling distributions, estimation of parameters and statistical treatment of data. Prerequisites: 482, 483, or permission of instructor. Offered: jointly with STAT 480; even years.

Q SCI 482, 483 Statistical Inference in Applied Research (5,5) NW Analysis of variance and covariance; chi square tests; nonparametric procedures multiple and curvilinear regression; experimental design and power of tests. Application to biological problems. Use of computer programs in standard statistical problems. Prerequisites: 381 or permission of instructor for 482; 381 or 482 or equivalent for 483. Offered: AW, WSp.

Q SCI 486 Experimental Design (3) NW Topics in analysis of variance and experimental designs: choice of designs, comparison of efficiency, power, sample size, pseudoreplication, factor structure. Prerequisite: 483 or equivalent, and matrix algebra. Offered: jointly with STAT 486.

Q SCI 499 Undergraduate Research (1-5, max. 5) Special studies in quantitative ecology and resource management for which there is not sufficient demand to warrant the organization of regular courses. Credit/no credit only. Prerequisite: permission of instructor.

Courses for Graduates Only

Q SCI 502 Statistical Consulting for the Life Sciences (1-4) Conquest, Rustagi Consulting experience in data analysis, applied statistics, experimental design, parameter estimation, and sampling. For graduate students in Quantitative Ecology and Resource Management. Student provides consultation services to students and faculty. Students spend one classroom hour per week under faculty supervision discussing problems encountered. Prerequisites: 482, 483, STAT 421, 423, or BIOST 514, 515, or equivalents, and permission of instructor. Entry code required.

Q SCI 514 Analysis of Ecological and Environmental Data I (3) Conquest, Skalski Factors affecting optimal growth of individuals in their habitat. Estimation of growth and mortality parameters. Response of organisms to changes in environment (bioassay, environmental monitoring). Stochastic viewpoint emphasized. Research design issues for ecological or environmental studies. Analysis of unwieldy data sets. Prerequisites: STAT 512 or STAT 341, 342; and knowledge of calculus.

Q SCI 521 Scientific Method in Resource Management (4) Ford, Hilborn Describes process of scientific discovery and strategies used for problems in ecology and natural resources management. Relationships between growth and use of objective knowledge in natural resources management is explored through

case studies. The 4-credit option is for development of a written research proposal.

Q SCI 550 Applied Ecological Modeling (4) *Ford, Francis* Methods of applied ecological modeling at individual community and ecosystem levels. Analysis of ecological problems suitable for modeling and assessment of models. Students construct a model of their own.

Q SCI 551 Modeling Organism Dynamics (3) *Anderson* Application of techniques of stochastic differential equations, time series analysis, simulating dynamic processes to plant and animal growth.

Q SCI 552 Spatial Processes in Ecology (3) *Ford* Spatial distribution of organisms, the mechanisms that produce different distributions, and how they may be described mathematically and modeled. Spatial distribution of communities, how this arises, and what its consequences are. Prerequisites: 482, 483, 550.

Q SCI 556 Mathematical Analysis in Fisheries Stock Assessment (3) *Gallucci* Analytic approaches to stock assessment and population management applications of parent-progeny models and logistic models; biological and economic yields of natural populations; analysis of population data on computers. Prerequisites: 292, 392, 456, 483; or permission of instructor. Offered: jointly with FISH 556.

Q SCI 557 Estimation of Population Parameters (4) *Skalski* Statistical analysis of population data; design and analysis of mark-recapture experiments on natural populations; laboratory work on computers. Prerequisites: 292, 483, and probability theory. Offered: jointly with FISH 557.

Q SCI 558 Advanced Analysis in Fisheries Stock Assessment (3) *Hilborn* Deterministic and stochastic representations of age-dependent and size-dependent models for stock assessment; analysis of multi-species models; risk analysis and uncertainty in fisheries management strategies; analysis of population data on computers. Prerequisite: 393, 556 or permission of instructor. Recommended: 557. Offered: jointly with FISH 558.

Q SCI 597 Seminar in Quantitative Ecology (2) Current topics in quantitative ecology and resource management. Fisheries, forestry, and marine resources. Offered: AWSp.

Q SCI 598 Special Topics in Quantitative Resource Management (1-3, max. 12) Population and community ecology, systems ecology, and physical processes in ecosystems. Prerequisite: permission of instructor. Entry code required.

Q SCI 599 Research in Quantitative Resource Management (*, max. 12) Topics can be theoretical in nature or combined theory and experiment. Research might be a prelude to thesis or dissertation research. Credit/no credit only. Entry code required.

University Conjoint Courses

See page 56 for explanation of course numbers, symbols, and abbreviations.

Each of the following courses is administered by two or more schools or colleges within the University. No degree program is offered.

Courses for Undergraduates

UCONJ 100 Introduction to Health Professions (1) *Garcia* Opportunities in health professions. Information on educational requirements, professional/patient interaction, interprofessional roles, licensing, registering for practice in profession, salaries, and career opportunities.

UCONJ 290 Diversity Issues in the Health Care Environment (1-2) I&S Introduction to the complexity of the issues surrounding culture and health, the interrelatedness of ethnic and cultural characteristics and health care access, health and health care concerns of specific communities, traditional and alternative health care practices, and community-based promotion and disease prevention programs.

UCONJ 411 Psychology of Aging (3) *Kiyak* Focuses on developing the skills necessary for critically evaluating current psychological theories of aging, research findings in this area, and the implications of findings on the aging person. Special consideration given to the effects of socioeconomic, sex, and ethnic differences in the psychology of aging. Open to upper-division undergraduates and beginning graduate students interested in the field of gerontology.

UCONJ 420 Biological Safety Practices (1) *Kenny* General introduction to appropriate laboratory procedures used for handling potentially hazardous biological agents. Particular focus on laboratory safety and appropriate protocols that should be employed by those engaged in infectious disease and recombinant DNA research. Credit/no credit only.

UCONJ 422 Sexually Transmitted Diseases: An Overview (2) *Elmer, Holmes* Clinically oriented course designed to provide a knowledge base for upper division health science students to participate effectively in community outreach programs for the prevention of sexually-transmitted diseases. Offered cooperatively by the departments of Medicinal Chemistry, and Medicine. Credit/no credit only.

UCONJ 440 Biological Aspects of Aging (3) Introductory course on aspects of the biology of human aging and of functional changes associated with normal aging and with those illnesses that may be present in the elderly. Focus on the relationship between changes in physical function, environment, and quality of life. Includes theoretical perspective on aging as well as the aging process in specific physiological systems. Designed for upper-level undergraduate students with an interest in aging. Prerequisite: introductory course in biology or permission of instructor.

UCONJ 442 Social and Cultural Aspects of Aging (3) Involves faculty members from the various social science fields examining the range and variation of relationships among age-linked attitudes and cultural values related to aging; the social and economic factors that influence the elderly in contemporary society; the effects of ethnic and sex differences in sociocultural aging. Open to upper-division undergraduates and beginning graduate students interested in gerontology. Entry code required.

UCONJ 443 Interdisciplinary Seminar on Aging (1-6, max. 15) *Borgatta* Interdisciplinary examination of the contemporary theoretical literature on gerontology and long-term care. For upper-level undergraduate and graduate students with an interest in aging. Quarterly offerings available from the Institute on Aging. Prerequisites: 411, 440, 442, or permission of instructor.

UCONJ 490 Social Sensitivity in Health Care (3) Multidisciplinary course for health professions students. Health professionals' roles in dealing with social, cultural, and physical barriers to health care of low-income groups and ethnic people of color. Personal involvement through field experiences and faculty drawn from affected communities as well as health sciences, social work schools. Credit/no credit only. Prerequisite: permission of instructor.

UCONJ 497 Health Care in a Rural Community (3) Critical analysis built upon concepts relative to interdisciplinary health-care delivery in a rural community. Students develop an organizational model for rural health care and study innovative ways of mobilizing community resources and support for a comprehensive rural health-care system. Pharmacy students, nurses, and other health professionals study applica-

tion of theory in an appropriate clinical setting within the conceptual framework of each student's professional field.

Courses for Graduates Only

UCONJ 500- Seminar in Interprofessional Collaboration (1-3), max. 7 Interdisciplinary teams composed of students and community members placed in diverse urban settings to address an identified community need by developing and implementing collaborative, community-based projects. Seminars emphasize interprofessional collaborative practice, intrapersonal understanding, interpersonal group process skills, organizational savvy, community awareness, and sociocultural sensitivity. Graduate School of Public Affairs. Offered: A-W-Sp.

UCONJ 501, 502, 503 International Health (1,1,1) *Hunt* Weekly seminar introduces students to issues and opportunities of participating in health care systems in other countries. Guest speakers bring many perspectives of international health care experiences. Class discussions help prepare students for international placements. Credit/no credit only.

UCONJ 510 Seminar in Neurobiology (0.5) Bi-weekly seminar on current topics in neuroscience. Recommended for students in the Graduate Program in Neurobiology and required for students supported on Graduate Neuroscience Program Training Grant. Physiology and Biophysics responsible.

UCONJ 511 Issues in Home Health Care Delivery (3) Service delivery issues relevant to provision of health care services across the life span in the home setting. Home health care as an important component in health care system. Individual and multidisciplinary practice of health care disciplines. Emphasis on research literature. Prerequisite: graduate student standing, upper division with permission of instructor.

UCONJ 513 Dynamics of Patient Management: Diabetes Mellitus (2) Analysis of advanced knowledge related to interdisciplinary management of diabetes. Commonalities and differences in provider approaches, recent research and its effect on management practices, collaborative communication, knowledge application. Brief interactive presentations, decision-making opportunities, discussion. Credit/no credit only. Prerequisites: graduate standing in pharmacy, dietetics, nursing; third- or fourth-year medical student; or permission of instructor.

UCONJ 520 Molecular Biophysics Research Seminar (1) *Parson* A series of research seminars for faculty and students involved with the molecular biophysics program. Credit/no credit only.

UCONJ 524 Developmental Neurobiology (3) *Reh, Rubel* Survey of contemporary issues in developmental neurobiology, including neurogenesis and differentiation; electrophysiological, morphological, and neurochemical regulation of cellular phenotype; neuronal pathways and synaptic contacts; cellular and synaptic plasticity; and behavior. Examination of molecular biological, morphological, electrophysiological, and behavioral approaches. Prerequisite: background in neurophysiology, neuroanatomy, molecular neurobiology.

UCONJ 525 Overview of Faculty Research in Neurobiology (1) Reviews research topics currently being studied in neurobiology. Student preparation consists of reading pertinent articles published on each topic. Credit/no credit only. Prerequisite: first year graduate student in neurobiology.

UCONJ 528 Introduction to Laboratory Research in Neurobiology (4) Students become familiar with, and assist in, the performance of research on ongoing projects in designated laboratories. Emphasis on employed methodology and techniques. Credit/no credit only. Prerequisite: first year graduate students in neurobiology.

UCONJ 527 Current Topics in Neurobiology (1) Presentation and discussion of current research in neurobiology in order to provide students with exposure to and understanding of the diverse areas of neurobiology research. Credit/no credit only. Prerequisite: graduate student in the Program in Neurobiology or permission of the instructors.

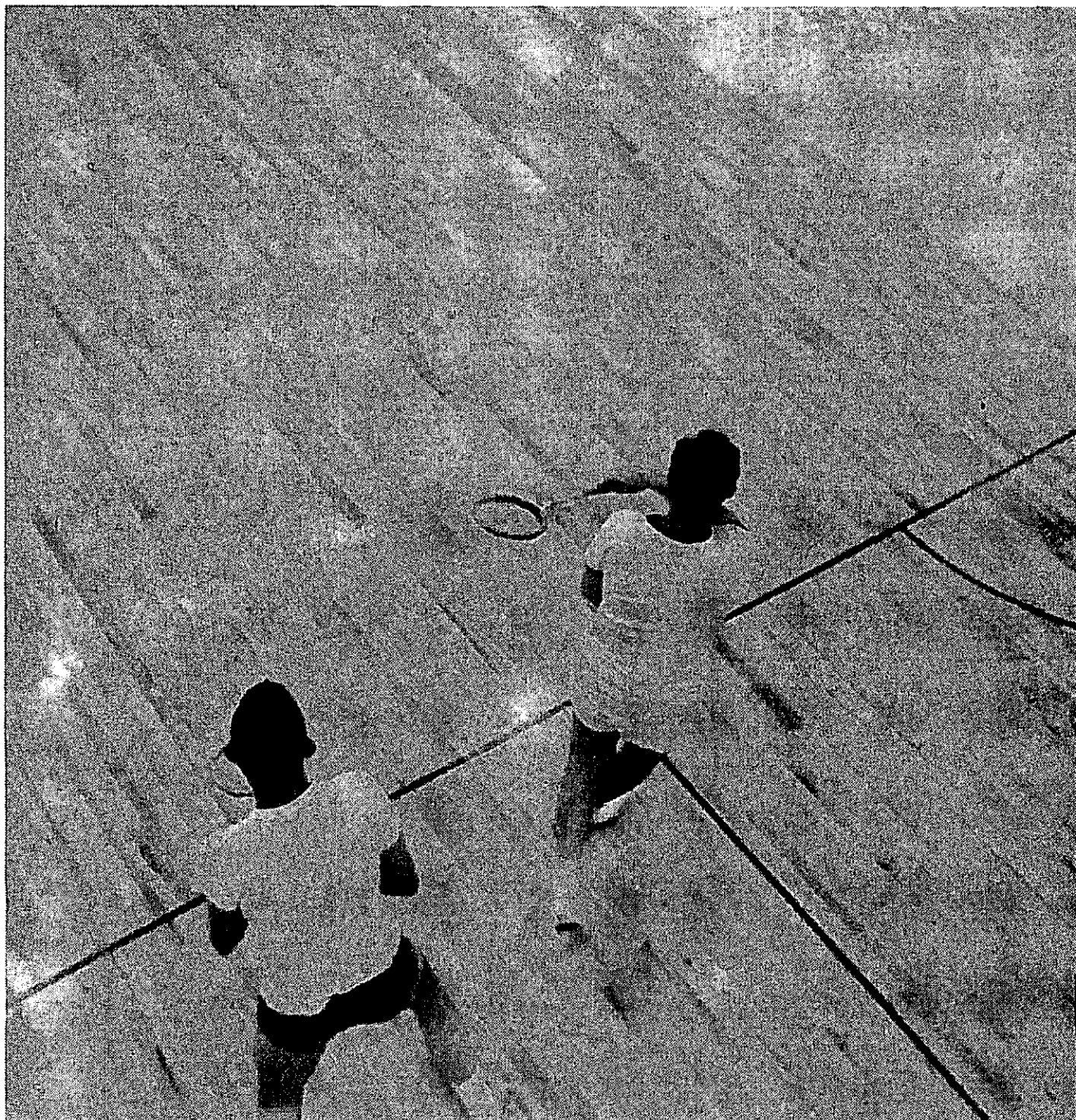
UCONJ 530 Issues in Indian Health (3) Survey of historical and contemporary issues in Indian Health. Covers Indian contributions to health, traditional Indian

Medicine, current disease epidemiology, development of Federal Indian Health policy, the Indian Health Service, tribal health programs, and consequences of major legislation on Indian Health. Prerequisite: current health science student or permission of instructor.

UCONJ 555 Principles of STD/HIV Research (3) Provides MD and PhD fellows and graduate students with a comprehensive overview of the current state of knowledge in specific areas of STD/HIV research, including study design, laboratory methods, production

of instruments for data collection, and methods for data analysis. Credit/no credit only.

UCONJ 584 Plant Tumors (1, max. 9) M. Gordon Discussion of the literature of plant tumors and current research work being carried on in this area at the University. Offered cooperatively by the departments of Biochemistry, Botany, and Microbiology and Immunology. Credit/no credit only. Prerequisite: offered only to persons actively pursuing work in this area.



School of Law

Dean

Roland L. Hjorth
326 Condon

Associate Dean

Thomas R. Andrews
306 Condon

Assistant Deans

Sandra E. Madrid
338 Condon

Kristina Udall
301 Condon

Established in 1889, the School of Law is a member of the Association of American Law Schools and is on the American Bar Association's list of approved law schools. Graduates of the School are prepared to practice law anywhere in the United States. Additional information about the School is contained in the current *School of Law* catalog.

Facilities and Services

The School of Law is housed in Condon Hall, adjacent to the University's main campus. It is equipped with classroom, library, lounge, and office facilities.

The Marian Gould Gallagher Law Library is one of the finest law libraries in the country. Its collection, among the largest university law collections on the West Coast, currently numbers more than 450,000 bound volumes and volume equivalents of microform. In addition to the extensive main collection, it houses important materials that support the Asian and marine law graduate programs and serves as a federal depository for selected United States government documents. An experienced audiovisual staff directs the use of video equipment in the trial advocacy and moot court programs. The library is equipped with the latest in micro-readers and printers in order to make full use of the growing microform collection. The library is a subscriber to LEXIS, WESTLAW, and the Western Library Network, and other research databases.

Juris Doctor Program

The Juris Doctor degree is conferred upon a student who has met the residence requirements, consisting of nine quarters of at least 12 credits each, and has earned at least 135 credits satisfactory to the School of Law.

As in most law schools of the United States, the first-year courses are required and are designed to introduce students to basic legal skills, foundational subject matter, and the variety of public and private processes with which the profession is concerned. Those courses deal with contracts, torts, property, civil procedure, criminal law, constitutional law, and basic legal skills.

Except for a required course in professional responsibility, the public service requirement, and an analytical writing requirement, courses in the second and third years are elective. Therefore, a student may choose a program designed to suit his or her interests and needs. J.D. candidates are required to perform 60 hours of public service legal work during the second and/or third year.

Admission

New students may enter the School of Law only in autumn quarter. Instruction begins for first-year students a few days earlier than the time set for upper-class students. Beginning students must have received a baccalaureate degree from an accredited college or university prior to commencing the study of law.

All applicants are required to take the Law School Admission Test (LSAT) and to register for the Law School Data Assembly Service (LSDAS). Registration packets and test information are available at most law schools and from Law School Admission Services, Box 2000, Newtown, PA 18940.

No specific prelaw course is required or recommended, and the School of Law subscribes to the remarks set forth on prelaw preparation in the *Prelaw Handbook—Official Guide to U.S. Law Schools*. Applications for admission to the next entering class must be received by January 15. To be assured of consideration for admission, an applicant must cause complete credentials, including the LSDAS report, to be filed in the School of Law by February 1. An application fee (at this writing, \$50) also is required.

Transfer Applicants

Students who have completed at least one year at a member school of the Association of American Law Schools may apply to this school for admission with advanced standing with credit for no more than one year of such work. A student who has completed or expects to complete at least two years of work at a member school of the Association of American Law Schools and who expects to graduate from that member school may apply to this school for admission as a non-degree candidate.

Applicants should request application forms and instructions from the admissions office in time to permit filing of the application by July 15. To be assured of consideration, the applicant must complete his or her application file by August 1.

Applications are considered only if vacancies exist. Selection of the applicants is based on evidence either (1) that the candidate can produce above-average work at this law school, or (2) that the candidate will contribute to the diversity of the student body.

Students working on law degrees to be conferred by the University have priority over non-degree candidates in the selection of courses. This policy is in accordance with the general University policy on the registration of nonmatriculated students.

Financial Aid

Students in need of financial assistance may receive University aid, School of Law aid, federal loans, or aid from all of these sources. To be considered for aid, applicants must submit the Free Application for Federal Student Aid (FAFSA) by February 28. FAFSAs are available in December in most college financial aid offices, or may be obtained by writing or calling the Office of Student Financial Aid, 105 Schmitz Hall, Box 355880, University of Washington, Seattle, WA 98195, (206) 543-6101. Applicants for admission should not wait until they have been admitted before applying for financial aid.

School of Law grants are awarded primarily on the basis of financial need, although scholarship, minority status, or other factors may be considered with regard to certain awards. Inquiries concerning School of Law aid should be addressed to: Financial Aid Coordinator, School of Law, Condon Hall, Box 354600, University of Washington, Seattle, WA 98195.

Inquiries

A more detailed statement on admission policy and application procedure is available in the School of Law. Requests for application materials and the University

law school bulletin should be addressed to Law School Admissions, Condon Hall, Box 354600, University of Washington, Seattle, WA 98195.

Graduate Program

Richard O. Kummert
Graduate Program Coordinator

In addition to the professional law program leading to the Juris Doctor degree, the law faculty offers graduate programs leading to the Master of Laws (LL.M.) in law and marine affairs, Asian and comparative law, international environmental law, the law of sustainable international development, and taxation. The School of Law offers the Doctor of Philosophy (Ph.D.) degree in Asian and comparative law only. The requirements for each program are as follows:

Asian Law Program

The Master of Laws degree program in Asian and comparative law is designed for students with career and research interests in one or more of the legal systems of East Asia, with particular emphasis on that of Japan, as well as for lawyers from East Asia seeking advanced comparative study of American law. The Asian law program is structured around extensive course offerings involving comparative study of basic areas of United States and East Asian law and tutorials in areas of special interest to each student.

Admission to the LL.M. degree program in Asian and comparative law is limited to language-qualified applicants who have received the first degree in law and who have a record of superior academic achievement. Graduates of American law schools must have a degree from an ABA-accredited institution. The applicant must be competent in an East Asian language (or, in the case of foreign students, in English). Students without the required competence may be admitted to the program, but must successfully complete an approved program of intensive study of an East Asian language before beginning their studies. The program contemplates one year in residence, at least 36 credits, and an acceptable major research undertaking.

Admission to the Ph.D. program in law is limited to exceptional scholar-lawyers who are fluent in English and in either Japanese, Chinese, or Korean. Prospective Ph.D. students must normally complete the LL.M. program before being accepted as Ph.D. students. The core of the program is a major creative research project using Asian-language sources as well as English-language sources. At least two, and usually three, years in residence are necessary in order to accomplish the work that must be done in order to pass the General Examination that precedes candidacy for the doctoral degree. An acceptable dissertation must thereafter be submitted to complete the requirements for the degree. The Candidate may spend a year abroad while working on the dissertation but must be in residence during the quarter in which the degree is to be conferred.

Law and Marine Affairs Emphasis

Students who have acquired a first degree in law can become prospective candidates for the LL.M. degree in law and marine affairs. Graduates of American law schools must have a degree from an ABA-accredited school. Particular emphasis is placed on interdisciplinary aspects of marine affairs and coastal zone management. Attainment of the LL.M. degree with specialization in law and marine affairs requires satisfactory completion of 40 credits of course and research work, at least 15 of which must be in the School of Law. In the School of Law, courses include Law of the Coastal Zone, International Law of the Sea, Ocean Policy and Resources, United States Law and the Marine Environment, and Admiralty. Pertinent courses are also offered in the schools of Fisheries, Marine Affairs, and Oceanography, the Graduate School of Public Affairs, the

College of Engineering, and the departments of Economics and Geography.

International Environmental Law Emphasis

Students may earn an LL.M. degree in international environmental law. This LL.M. degree option is open to students with a first degree in law. Graduates of American law schools must have a degree from an ABA-accredited school. Emphasis is placed on the interdisciplinary study of environmental problems, and students may earn more than half of their credits in courses outside of the School of Law, including courses offered by the schools of Fisheries and Marine Affairs, the Graduate School of Public Affairs, the colleges of Engineering and Forest Resources, and the departments of Atmospheric Sciences, Economics, Environmental Health, and Geography. Courses offered in the School of Law include Environmental Law: Pollution Control, Natural Resources: Energy, U.S. Law and the Marine Environment, International Environmental Law, and Land Use Planning. To earn the LL.M. degree, students must satisfactorily complete 40 credits of course and research work, at least 15 of which must be in the School of Law. Students must take LAW A 527, Environmental Law: Pollution Control and LAW A 574, The International Legal Process unless they have had equivalent courses; and one course on international environmental law. As part of their course work or an independent study project, students must write one substantial paper.

Law of Sustainable International Development Emphasis

Students may earn an LL.M. degree in the law of sustainable international development. This LL.M. degree option is open to students with a first degree in law. Graduates of American law schools must have a degree from an ABA-accredited school. Emphasis is placed on the interdisciplinary study of sustainable international development, and students may earn more than half their credits in courses outside the School of Law, including courses offered by the schools of International Studies and Public Health, and the departments of Economics, Political Science, and Sociology. In the School of Law, courses offered include Legal Problems of Economic Development (required), International Environmental Law (required), Public Land Law, International Commercial Law, and Land, American Culture, and the Law. Attainment of the LL.M. degree with specialization in the law of sustainable international development requires satisfactory completion of 40 credits of course and research work, at least 15 of which must be in the School of Law, and the taking of courses in at least three other departments other than law. As part of their work, students must write one substantial paper.

Taxation

Students may earn an LL.M. degree in taxation. This LL.M. degree option is open to students with a first degree in law. Graduates of American law schools must have a degree from an ABA-accredited school. International students must have a first degree in law or equivalent and may be admitted by the permission of the Director. A candidate for the LL.M. degree must successfully complete 36 quarter hours of course work. Students who qualify may be enrolled either on a full-time or a part-time basis. Full-time students can complete the course of study within one nine-month academic year, while those participating on a part-time basis are allowed six academic years to complete the degree. Generally all courses must be taken from the Graduate Tax Curriculum, although candidates for the LL.M. may, with the permission of the Director, take up to six credits of course work in the Law School's J.D. curriculum. Certain core courses are required: Federal Tax Controversies and Procedure; Taxation of Corporations and Shareholders; Tax Accounting; Property Dispositions and Transactions; and Taxation of Partners and Partnerships. The remainder of the curriculum is elective.

Financial Aid

Scholarship funds for graduate students in law are quite limited. Inquiries should be made to Law School Graduate Admissions, Condon Hall, Box 354600, University of Washington, Seattle, WA 98195, U.S.A.

Inquiries

Requests for applications and program brochures for all School of Law LL.M. programs except the LL.M. in taxation, as well as information regarding application procedures should be addressed to Charles Freeman, Law School Graduate Admissions, Condon Hall, Box 354600, University of Washington, Seattle, WA 98195, U.S.A.

Requests for applications and program brochures for the LL.M. in taxation should be addressed to Jacqueline Fisher, Law School Graduate Tax Admissions, Condon Hall, Box 354600, University of Washington, Seattle, WA 98195.

Faculty

Professors

Andersen, William * 1964; LLB, 1956, University of Colorado (Denver); LL.M, 1958, Yale University; administrative law, regulated industries, urban government, legislation and public policy.

Andrews, Thomas R. * 1985; MA, 1973, Northwestern University; JD, 1979, University of Pennsylvania; professional responsibility in legal practice, community property, decedents' estates, torts.

Aronson, Robert H. * 1975; JD, 1973, University of Pennsylvania; evidence, criminal law, professional responsibility, law and literature.

Bodansky, Daniel * 1989; JD, 1984, Yale University; international law, international environmental and human rights law, civil procedure.

Burke, William T. * 1968; JD, 1953, Indiana University; JSD, 1959, Yale University; marine law.

Chisum, Donald S. * 1969; LLB, 1968, Stanford University; corporations, civil procedure, intellectual property.

Corker, Charles E. * 1965, (Emeritus); LLB, 1946, Harvard University; contracts, constitutional law.

Cross, Harry M. * 1943, (Emeritus); JD, 1940, University of Washington; property.

Ellis, Jane W. 1987; JD, 1983, Yale University; juvenile justice and domestic relations, interviewing and counseling.

Emory, Meade 1995, (Acting); LLB, 1957, George Washington University; LL.M, 1962, Boston University; federal taxation.

Fitzpatrick, Joan M. * 1984; JD, 1975, Harvard University; international human rights and civil rights, federal courts, immigration, constitutional law.

Fletcher, Robert L. * 1956, (Emeritus); LLB, 1947, Stanford University; property.

Foote, Daniel * 1988; JD, 1981, Harvard University; comparative law with a focus on Japan and Asia, labor and employment law.

Haley, John O. * 1974; LLB, 1969, Yale University; LL.M, 1971, University of Washington; comparative law (Japan), antitrust, contracts.

Hardisty, James * 1970; LLB, 1966, Harvard University; criminal law and procedure, psychiatry and law, juvenile courts, torts, family law.

Henderson, Dan F. * 1962, (Emeritus); LLB, 1949, Harvard University; PhD, 1955, University of California (Berkeley); U.S./Japanese business transactions, corporate relations, admiralty.

Hershman, Marc * 1976, (Adjunct); JD, 1967, Temple University; LL.M, 1970, University of Miami (Florida); coastal zone management law.

Hicks, Gregory A. 1984; JD, 1978, University of Texas (Austin); securities regulation, property, environmental law.

Hjorth, Roland L. * 1964; LLB, 1961, New York University; transnational tax, Common Market, federal taxation.

Hume, Linda S. * 1972; JD, 1970, University of California (Los Angeles); commercial transactions, property, equal rights, legal writing and analysis.

Jay, Stewart M. * 1980; JD, 1976, Harvard University; civil procedure, theories of justice, federal courts, constitutional law.

Junker, John M. * 1964; JD, 1962, University of Chicago; criminal law and procedure, evidence.

Kummert, Richard O. * 1964; MBA, 1955, Northwestern University; LLB, 1961, Stanford University; business planning, corporations, federal tax.

Loftus, Elizabeth F. * 1973, (Adjunct); PhD, 1970, Stanford University; cognition, long-term memory, eyewitness testimony, psychology and law.

Morris, Arval * 1955; JD, 1955, University of Colorado (Boulder); LL.M, 1958, Yale University; LL.D, 1972, Colorado College; constitutional law, jurisprudence, education law, civil rights.

Peck, Cornelius J. * 1954, (Emeritus); LLB, 1949, Harvard University; administrative law, labor law, torts.

Price, John R. * 1969; LLB, 1961, New York University; estate planning, taxation, property, elder law, professional responsibility.

Prosterman, Roy L. * 1965; LLB, 1958, Harvard University; international law, sustainable international development.

Rieke, Luvern V. * 1949, (Emeritus); LLB, 1949, University of Washington; LL.M, 1953, University of Chicago; contracts, family law.

Rodgers, William H. * 1979; LLB, 1965, Columbia University; legislation, environmental law, resource management, property.

Rombauer, Marjorie D. * 1960, (Emeritus); LLB, 1960, University of Washington; creditor and debtor; personal property; legal research, writing, and analysis.

Schnapper, Eric 1995; MA, 1963, Johns Hopkins University; LLB, 1968, Yale University; constitutional law, civil procedure, civil rights, employment discrimination.

Smith, Charles Z. * 1973, (Emeritus); JD, 1955, University of Washington; evidence, judicial administration.

Smith, Frank W. Jr. * 1968; JD, 1962, University of Richmond; LL.M, 1968, Harvard University; commercial law, bankruptcy, real property security.

Stoebe, William B. * 1967; MA, 1953, Indiana University; JD, 1959, University of Washington; SJD, 1973, Harvard University; property, land use, legal history.

Trautman, Philip A. * 1956; JD, 1954, University of Washington; conflict of laws, civil procedure.

Vaughn, Lea B. * 1984; JD, 1978, University of Michigan; labor law, alternate dispute resolution, civil procedure.

Wolcher, Louis E. * 1986; JD, 1973, Harvard University; contracts, critical legal studies, torts, remedies.

Zerbe, Richard O. * 1975, (Adjunct); PhD, 1969, Duke University; law and economics, cost-benefit analysis, economic history, environmental regulation.

Associate Professors

Jecker, Nancy A. S. * 1982, (Adjunct); MA, 1982, Stanford University; MA, 1984, PhD, 1986, University of Washington; philosophical and ethical aspects of health care delivery and policy.

Kirtley, Alan 1984; JD, 1972, Indiana University; clinical legal education, affordable housing development, alternative dispute resolution.

Assistant Professors

Kuszler, Patricia Carol 1994; MD, 1978, Mayo Medical School/Graduate School; JD, 1991, Yale University; regulation and financing of health care, medical malpractice, biotechnology, insurance law, torts.

Townsend, Michael F. 1992; MA, 1978, PhD, 1982, University of Michigan; JD, 1989, Yale University; intellectual property, contracts.

Wiehl, Lis W. 1993; MA, 1985, University of Queensland (Australia); JD, 1987, Harvard University; trial advocacy, professional responsibility, criminal law.

Senior Lecturers

Jones-Garling, Michele 1993; JD, 1987, Gonzaga University; family law, children's rights.

Maranville, Deborah 1989; JD, 1975, Harvard University; Civil Clinic, unemployment law, feminist legal theory.

McMurtrie, Jacqueline 1989; JD, 1983, University of Michigan; criminal law and practice.

O'Neill, Kathleen M. 1993; JD, 1980, Columbia University; legal research, writing, and analysis.

Stearns, Janet E. 1993; JD, 1988, Yale University; affordable housing, clinic, real estate.

Lecturers

Anderson, Helen A. 1994; JD, 1984, University of Washington; legal research, writing, and analysis.

Gold, Julia Ann 1995; JD, 1983, University of South Carolina; alternative dispute resolution, mediation.

O'Neill, Catherine A. 1994; JD, 1990, University of Chicago; legal research, writing, and analysis.

Rowland, Melanie 1992; JD, 1974, University of Pennsylvania.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

LAW 300 Introduction to Law (3-6) I&S Understanding the legal system, its functions in the social-economic order, legal reasoning, and the world of legal education and the legal profession. Open to nonlaw students only.

LAW 410 Problems in Professional Responsibility (4)

LAW 416 International Contracting: Negotiation and Drafting (3) I&S Skills course designed to introduce process and problems of negotiating and drafting international agreements. Client interviewing and counseling and negotiation and drafting of a contract between parties in the United States and Japan. Credit/no credit only. Open to nonlaw students only.

LAW 442 Land Law and the Urban Environment (3) I&S Examination of the major legal tools available to shape the urban environment by controlling the use of land. Considers zoning, subdivision controls, urban renewal, private land-use restrictions, and the rules of nuisance law. Credit/no credit only. Open to law and nonlaw students.

LAW 443 The Legal Process I (3/5) I&S The system of law and its functions rather than substantive law pertaining to any particular subject or discipline. Open only to nonlaw students. Credit/no credit only.

LAW 444 Constitution and American Public Education (3-6) I&S Examines the relationships between the Constitution of the United States and the American system of public education, excluding higher education, in areas of constitutional freedom and legal controls, racial desegregation, and equal educational opportunity, including equal financing of the public schools. Credit/no credit only. Offered: jointly with EDLPS 444.

LAW 445 Major Issues in American Constitutional Law (3) I&S Significant themes in American constitutional law. Doctrine of judicial review, application of the Bill of Rights to the states, Supreme Court's recognition of fundamental rights, the Equal Protection clause, the Religion clauses, freedom of speech, and Presidential powers. Open to law and nonlaw students.

LAW 446 Race, Age, and Sex Discrimination in Employment (3) I&S What constitutes race, age, and sex discrimination in employment, and related prohibited practices that limit employment opportunities. Methods of proving such discrimination and establishing that a practice should be prohibited. Remedies for violations considered. Open to law and nonlaw students.

LAW 447 Critical Perspectives in Law (3) I&S Examination of modern critical legal thought and critics views regarding proposed alternative forms of social ordering.

LAW 467 American Law and the American Indian (3) I&S Relationship between Indians and the United States from 1789 to the present. Significant constitutional, legislative, and judicial actions. Legal events explored within their political, military, social, and cultural contexts. Comparisons with other minority-group experiences. Offered: jointly with HSTAA 416.

LAW 476 International Economic Relations and Trade Policy (3) I&S Consideration of international control of national trade policies and permissible transnational reach of national trade or other regulation The General Agreement on Tariffs and Trade (GATT) and the international monetary system examined from legal and economic perspective. Examination and comparison of prescriptive jurisdiction to public international law.

LAW 477 Law and Literature (3) VLPA/I&S Examines literary portrayals of law, lawyers, and the legal system. Considers portrayals purporting to depict accurately the character of lawyers or the efficacy of the legal system, and works envisioning lawyers and the legal system in a "better world". Explores the interrelations between literary works and appellate decisions.

LAW 481 Land, American Culture and the Law: Perspectives on the Use and Ownership of the Natural Environment (1-6)

LAW 489 Law and Aging (3) I&S Survey of principal areas of law of special concern to aging population, considering health care and health care decision-making, public and private income maintenance programs, taxation, guardianships, conservatorships and other methods of protecting the property of the elderly, counseling, and professional responsibility.

LAW 495 Introduction to Law: A Social Science Perspective (4) I&S Policy-oriented, interdisciplinary study of uses and limits of social science in the law-making process on appeal and fact-finding process at trial. Critical perspectives on roles of social science, especially social psychology, in adjudication. Open to upper-division undergraduates and graduate students only. Offered: jointly with PSYCH 495.

First-Year Courses

The courses below are intended for law students; other students are admitted only rarely with special permission of the Dean. Only the course titles are given. For complete course descriptions, see the School of Law Bulletin.

LAW A 501- Contracts ([2-8]-)

LAW A 502- Civil Procedure I ([2-6]-)

LAW A 503- Property I ([2-8]-)

LAW A 504- Torts ([2-8]-)

LAW A 505- Criminal Law ([2-5]-)

LAW A 506- Basic Legal Skills ([1-6]-)

LAW A 507 Constitutional Law I: Constitutional Structures of Government (4)

Second- and Third-Year Courses

LAW A 508 Payment Systems (3)

LAW A 509 Administrative Law (4)

LAW A 510 Sales: A Comparative Perspective (2)

LAW A 511 Transmission of Wealth (5)

LAW A 512 Secured Transactions III (3)

LAW A 513- Creditor-Debtor Law ([2-3]-)

LAW A 514 Corporations (3/4)

LAW A 515 Business Organizations (5)

LAW A 516 Legal Accounting (4)

LAW A 517 Securities Regulations (4)

LAW A 518 Restitution (3)

LAW A 520- Property II ([2-8]-)

LAW A 521 Community Property (3)

LAW A 522 Copyright (3)

LAW A 523 Real Property Security (3/4)

LAW A 524 Private Land Development (3)

LAW A 525 Water Law (3)

LAW A 526 Copyrights and Trademarks (4)

LAW A 527 Environmental Law: Pollution Control (4)

LAW A 528 Natural Resources: Energy (3)

LAW A 529 Public Land Law (3)

LAW A 530- Basic Income Tax ([2-6]-)

LAW A 531 Death and Gift Taxation (2-5)

LAW A 532 Corporate Taxation (5)

LAW A 533 Partnership Taxation (3)

LAW A 534 The Beginning and End of Life: Rights and Choices (3)

LAW A 535 Trademarks and Unfair Competition (2)

LAW A 536 Deferred Compensation (3)

LAW A 537- Business Planning ([2-6]-)

LAW A 538 Estate Planning Workshop (4)

LAW A 539 Medical Ethics and Jurisprudence (3)

LAW A 540 Land Use Planning (3)

LAW A 541 Transnational Tax (5)

LAW A 542 Land Law and the Urban Environment (3)

LAW A 543 Business Reorganization Under the Bankruptcy Code (5)

LAW A 544 Advanced Commercial Law (3)

LAW A 545 International Environmental Law (3)

LAW A 546 Legal Protection for Technology: Patent and Trade Secret Law ([2-4]-)

LAW A 547 Critical Legal Studies (3)

LAW A 548- Civil Rights ([2-6]-)

LAW A 549 Advanced Legal Research (4)

LAW A 550- Constitutional Law ([2-8]-)

LAW A 551 Constitution and American Public Education (3-6) No credit given if LAW/EDLPS 444 taken previously.

LAW A 552- Antitrust ([2-5]-)

LAW A 553 Feminist Legal Theory (4)

LAW A 554- Labor Relations and the Law ([1-5]-)

LAW A 555 Labor Relations in the Public Sector (3)

LAW A 556- Employment Discrimination ([2-4]-)

LAW A 557 Foreign Affairs and the Constitution (3)

LAW A 558- Jurisprudence and Legal Philosophy ([2-4]-)

LAW A 559 Legal Method (3)

LAW A 560 Income Maintenance Legislation (3)

LAW A 561 Law and Economics (3) Offered: jointly with PB AF 532.

LAW A 562 Employment Law (3/4)

LAW A 563 Urban Government (4)

LAW A 564 Legal History (3)

LAW A 565 American Indian Law (3)

LAW A 566- Theories of Justice ([2-4]-)

LAW A 567 Disabled and the Law (2)

LAW A 568 Collective Bargaining and Labor Arbitration (4)

LAW A 570 Legal Problems of Economic Development (3)

LAW A 571 International Organizations (3)

LAW A 572 International Legal Order (3)

LAW A 573 Arms Control and Disarmament: The Legal Perspective (3)

LAW A 574 The International Legal Process (2-4)

LAW A 575 United States Legal History (3)

LAW A 576 International Economic Relations and Comparative Trade Policy (3/4)

LAW A 577 Immigration Law (4)

LAW A 578- International Commercial Law ([1-4]-)

LAW A 579 Advanced Family Law (3)

LAW A 580 Family Law (4)

LAW A 581 Washington Constitutional Law Seminar ([1-4]-)

LAW A 583 Insurance Law (4)

LAW A 585 Admiralty (3)

LAW A 586 Secured Transactions IV (4)

LAW A 587 Computer Law (3)

LAW A 589 Law and Aging (3)

LAW A 590 Constitutional Law: Equal Protection, Fundamental Rights, and Due Process of Law (4)

LAW A 591 Constitutional Law: Freedom of Expression (3)

LAW A 592 Constitutional Law II: The Fourteenth and First Amendments—Equal Protection, Fundamental Rights, Due Process of Law, Freedom of Expression and Religion (2-8)

LAW A 593 Constitutional Law: The Constitution and the Economy (3)

LAW A 594 International and Comparative Intellectual Property Law (2)

LAW A 596 Law, Medicine, and Health Care Delivery ([1-4]-)

LAW A 597 Health Care Financing and Regulation (4)

LAW A 598 Legal Bibliography (3) Offered: jointly with LIS 544.

LAW A 599 Advanced Legal Bibliography (4) Offered: jointly with LIS 557.

LAW B 500 Civil Procedure II (3)

LAW B 501 Criminal Procedure IV (4)

LAW B 502- Criminal Procedure VI ([2-6]-)

LAW B 503- Evidence ([2-6]-)

LAW B 505 Medical Malpractice (3)

LAW B 506- Conflicts of Laws ([2-6]-)

LAW B 507 Federal Courts and the Federal System (3/4)

LAW B 508 Injunctions (4)

LAW B 509 Seminar: Special Problems in Insurance and Risk Management (1-4)

LAW B 510- Problems of Professional Responsibility (2-4)

LAW B 511 Seminar on Problems in International Environmental Law ([1-4]-)

LAW B 512 Legislation and the Formulation of Public Policy (3)

LAW B 513 Evidence IV (4)

LAW B 515 Criminal Procedure (5)

LAW B 516 International Contracting: Negotiations and Drafting (2-4) Credit/no credit only.

LAW B 517 Juvenile Justice Seminar ([1-6]-)

LAW B 519 Pre-Trial Practice (3)

LAW B 520- Trial Advocacy ([2-6]-) Credit/no credit only.

LAW B 521- Appellate Advocacy ([1-3]-)

LAW B 522 Mediation of Disputes (3) Credit/no credit only.

LAW B 523 Negotiation: Dispute Settlement, and Planning (3) Credit/no credit only.

LAW B 524 Litigation, Negotiation, and Alternative Methods of Dispute Resolution (3) Credit/no credit only.

LAW B 525 Alternative Dispute Resolution (3) Credit/no credit only.

LAW B 526 Mediation Clinic (1-7) Credit/no credit only.

LAW B 527 Criminal Law Clinic (8) Credit/no credit only.

LAW B 528 Family and Unemployment Clinic I (2-8) Credit/no credit only.

LAW B 529 Advanced Environmental Law and Practice ([1-4]-)

LAW B 530- Judicial Externship ([1-15]-)

LAW B 532- Supervised Analytic Writing ([1-3]-)

LAW B 533 Interviewing and Counseling for Lawyers (2/3) Credit/no credit only.

LAW B 534 Affordable Housing Development Clinic ([1-12]-)

LAW B 535- Legislative Externship ([1-15]-) Credit/no credit only.

LAW B 536 Introduction to Legal Drafting (3)

LAW B 537 Refugee Advocacy Clinic ([1-12]-) Credit/no credit only.

LAW B 538- Agency Externships ([1-15]-) Credit/no credit only.

LAW B 539 Public Interest Law Externship ([1-15]-) Credit/no credit only.

LAW B 560 Criminal Justice Externship (1-15) Credit/no credit only.

Asian and Comparative Law

LAW B 540 Law in East Asia: Japan (4) Offered: jointly with SISEA 540.

LAW B 541 Law in East Asia: China (3) Offered: jointly with SISEA 543.

LAW B 542 Law in East Asia: Korea and Southeast Asia (3)

LAW B 544- Transnational Litigation: United States-Japan ([2-4]-)

LAW B 546- United States-Japanese Corporate Relations ([2-4]-)

LAW B 547 United States-Japanese Tax Problems (3/4)

LAW B 548 Japanese Administrative Law (3) Offered: jointly with SISEA 548.

LAW B 549 Government Regulation of Business in Japan (3) Offered: jointly with SISEA 549.

LAW B 550- Legal Analysis and Research for Students Not Trained in the Common-Law System ([1-4]-)

LAW B 551- Comparative Law Seminar ([2-6]-)

LAW B 552- Tutorial in Comparative Law ([1-4]-)

LAW B 553 Chinese Legal Tradition (3) Offered: jointly with SISEA 553.

LAW B 554 Survey of Russian Law (3)

LAW B 555 Roman Law (3)

LAW B 559 Comparative Law: Europe, Latin America, and East Asia (3)

Law and Marine Affairs

LAW B 561 International Law of the Sea (4) Offered: jointly with SMA 506.

LAW B 563-564 Ocean Policy and Resources Seminar (3-3)

LAW B 565 United States Law and the Marine Environment (3) Offered: jointly with SMA 515.

LAW B 568 Principles of Coastal Zone Management (3) Offered: jointly with SMA 509.

Seminars

LAW B 567 General Externship Perspectives Seminar (2) Credit/no credit only.

LAW B 568 Advanced Professional Responsibility (2)

LAW B 569 Judicial Externship Perspectives Seminar (2) Credit/no credit only.

LAW B 573- Comparative Commercial Law Seminar ([2-6]-)

LAW B 575- The Supreme Court and the Constitution ([2-6]-)

LAW B 577- Law and Literature Seminar ([1-6]-)

LAW B 578- Seminar on Legal Problems of Economic Development ([1-6]-)

LAW B 579 Criminal Justice Externship Perspective Seminar (2) Credit/no credit only.

LAW B 580 Externship Tutorial (2) Credit/no credit only.

LAW B 581- Land, American Culture, and the Law: Perspectives on the Use and Ownership of the Natural Environment ([1-6]-)

LAW B 582 Parents, Children, and Dissolution (1-6)

LAW B 584- Indian Law Seminar ([2-6]-)

LAW B 585 Natural Resources Damages Seminar (1-4)

LAW B 586- Biology and Law Seminar ([1-6]-)

LAW B 587 Lawyers, the Legal System, and Professionalism (2)

LAW B 588- Advanced Antitrust Seminar ([1-4]-)

LAW B 589- Intellectual Property Law Seminar ([1-4]-)

LAW B 590 The United States Constitution: Past, Present, and Future (2)

LAW B 591 Seminar: The Legal Orders of North-east Asia: An Historical Perspective (2-6)

LAW B 592- Seminar on the Legal Rights of Handicapped Persons ([1-4]-)

LAW B 594- Public Land Law Seminar ([2-6]-)

LAW B 595- Mental Health Law Seminar ([1-4]-)

LAW B 596 International Protection of Human Rights Seminar (2-4)

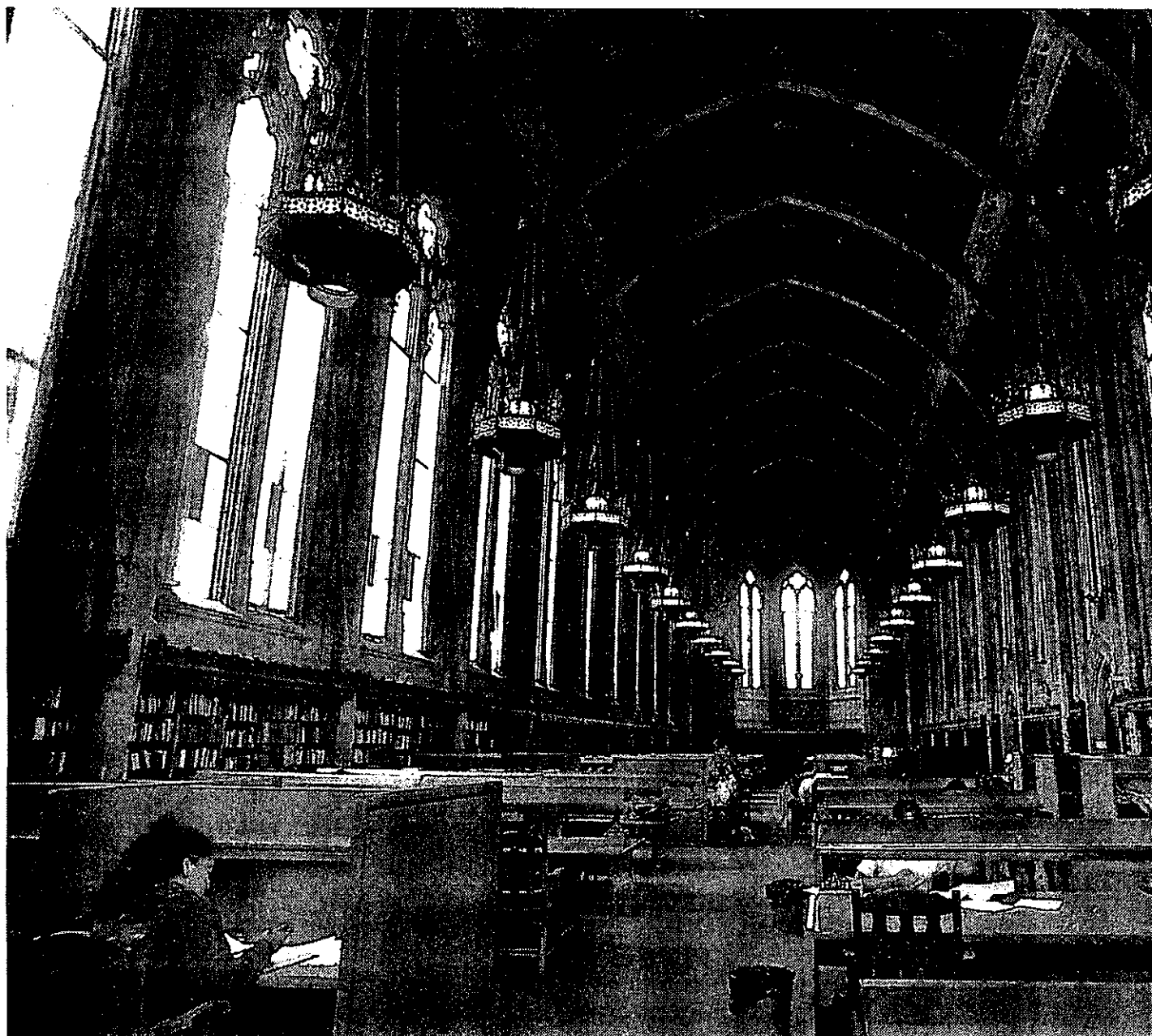
LAW B 597 History of the Formation of the United States Constitution Seminar (2-6)

LAW B 598- Advanced Research and Writing in Property Seminar ([1-4]-)

LAW B 599 Special Topics (1-12)

LAW 600 Independent Study or Research (*)

LAW 800 Doctoral Dissertation (*)



Graduate School of Library and Information Science

Director

Phyllis J. Van Orden
133 Suzzallo

Graduate Program

"People and Knowledge: Building Information Connections" is the vision statement adopted by the School.

A 63-credit course of study leads to the Master of Librarianship degree, which prepares graduates for professional information-related positions in libraries and other environments. The School's curriculum incorporates a significant number of courses in the organization, storage, retrieval, and management of information through the use of diverse technologies. Foundation courses provide the theoretical base for the program. Technical and advanced courses are organized around five areas of concentration: managerial tools, organization of resources, information resources and retrieval, design and provision of information services, and environments of information service.

The law librarianship program requires a J.D. degree for admission and may be completed in one calendar year. This specialized program of study prepares lawyers to serve as law librarians in courts, federal and state governmental agencies, schools of law, corporations, and law firms. The law librarianship courses are open to all GSLIS students.

Special Research Facilities

The School's computer laboratory provides a dedicated facility for research and instruction in the design and use of information systems. Students use data bases, applications software, programming packages, and have access to the University's computer network and off-campus bibliographic utilities and information services.

Admission Requirements

Admission is subject to the approval of the School's admissions committee. A complete application file includes: application for admission; official transcripts; Graduate Record Examination scores, general test section (an exception is made for those who have completed a Ph.D. program); three letters of recommendation; and a statement of educational and professional goals. International students (except those from English-speaking countries) are required to take the Test of English as a Foreign Language (TOEFL) examination. Students may be admitted any quarter, though most choose to begin autumn quarter. Completed applications for admission for summer or autumn quarters must be received prior to March 15, for winter quarter prior to November 1, and for spring quarter prior to February 1. Students are strongly advised to complete their applications early.

In addition to the above requirements, an applicant for the law librarianship program must hold a degree from

an accredited American law school or from a law school in one of the common-law countries.

The Graduate School of Library and Information Science brochure gives full details of application procedures.

Financial Aid

The School has funding available each year for one staff assistantship. In addition, fellowships/scholarships from the Cobb, Finley Multiethnic, Henry, Koon, McAlpin, and Page endowment funds are awarded each year. The amount of assistance and number of awards varies from year to year. All awards have financial need as one criterion, which is based on the figures the applicant provides on the Free Application for Federal Student Aid (FAFSA). This form is available from the Office of Student Financial Aid in mid-December and must be submitted by February 28 each year. The School is unable to offer financial assistance to international students. Other fellowships are described in *Financial Assistance for Library Education*, available from the American Library Association, 50 East Huron Street, Chicago, Illinois 60611.

Correspondence and Information

Director

Graduate School of Library and Information Science,
Box 352930

Faculty

Professors

Ahlers, Eleanor E. 1966, (Emeritus); MA, 1957, University of Washington; librarianship.

Benne, Mae M. * 1971, (Emeritus); MS, 1955, University of Illinois; children's literature, public library services for children.

Bevis, L. Dorothy 1947, (Emeritus); MA, 1951, University of Washington; librarianship.

Chisholm, Margaret E. * 1975, (Emeritus); PhD, 1966, University of Washington; organization and administration, library education.

Hiatt, Peter * 1974; PhD, 1963, Rutgers University; adult services, special populations, management assessment, community analysis, library education.

Lieberman, Irving 1956, (Emeritus); MA, 1950, EdD, 1955, Columbia University; librarianship.

Shaw, Spencer G. * 1970, (Emeritus); BLS, 1941, University of Wisconsin; librarianship.

Van Orden, Phyllis J. * 1993; EdD, 1970, Wayne State University; library services to youth, children's literature, collection development.

Associate Professors

Brooks, Terrence A. * 1986; PhD, 1981, University of Texas (Austin); information storage and retrieval, query language design, bibliometrics, relevance research.

Doll, Carol A. * 1988; PhD, 1980, University of Illinois; library materials for and services to children and young adults.

Fidel, Raya * 1982; PhD, 1982, University of Maryland; information systems, systems analysis, user interaction, classification research.

Johnson, Ronald A. 1986; MA, 1972, University of Chicago; MS, 1975, University of Southern California; information sciences.

Mignon, Edmond * 1970; PhD, 1976, University of California (Berkeley); information retrieval, bibliographic organization, information policy, government statistics.

Skelley, Grant T. * 1969; PhD, 1968, University of California (Berkeley); bibliography and reference, subject literature, history of the book, preservation.

Assistant Professors

Nelson, Jerold A. * 1971; PhD, 1971, University of California (Berkeley); information access and use, intellectual freedom.

Oh, Sam Gyun 1994; MLS, 1983, Villanova University; PhD, 1994, Syracuse University; database design, information retrieval, interface design, distributed information system.

Soper, Mary E. * 1972; PhD, 1972, University of Illinois; technical services, organization of library materials, cataloging, subject analysis, serials.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

LIS 450 Survey of Children's Literature (3) Designed for educators, librarians, and others interested in the selection and utilization of children's books for family, school, and library enrichment. Not open to Library and Information Science majors. Prerequisite: junior or higher standing.

LIS 451 Young Adult Materials: Evaluation and Use (3) Reading and appraisal of literature appropriate to the needs, interests, and abilities of young adults. For the general student as well as the teacher. Not open to Library and Information Science majors. Prerequisite: junior or higher standing.

LIS 470 History of the Book (3) Survey of the development of the book from hieroglyphics and clay tablets to the present, with emphasis on the printed book in the Western world since Gutenberg. The book as a physical object and the processes and materials of its production, viewed in the context of changing technologies and various cultural, esthetic, economic, and trade influences. Includes aspects of book collecting. Credit/no credit only. Prerequisite: junior or higher standing.

LIS 471 Storytelling: Art and Techniques (3) Storytelling, past and present, noting its development as an art form. Reading and analyzing storytelling materials (folk literature and literary forms) used by storytellers throughout historical periods. Learning essential techniques necessary to maintain this artistic skill in a professional field. Planning storytelling programs for various age and interest groups and situations, utilizing folk, classic, and contemporary literature. Not open to Library and Information Science majors. Prerequisite: junior or higher standing.

LIS 497 Learning Resources Endorsement Topics (3, max. 8) School library media center subject matter presented in seminar, workshops or other appropriate formats. Topics meet the Learning Resources Endorsement areas of study required for the learning resources endorsement. Not open to Library and Information Science majors. Prerequisite: junior or higher standing.

LIS 498 Special Topics (1-5, max. 15) Library service and information science subject matter in seminars, workshops, or other appropriate formats. Topics vary and may be repeated for credit. Credit/no credit only. Prerequisite: junior or higher standing.

LIS 500 Society, Users, and Libraries (4) Technological, societal change as it relates to information. Society's information processes, ways individuals use information in their environments. Skills basic to other courses developed, including awareness of resources for study of library and information science. Intellectual context of librarianship as service profession. Prerequisite: major standing.

LIS 501 Bibliographic Control (4) Survey of the major types of instruments for the bibliographic control of the various kinds of library materials and of the conventions used in describing them. Basic concepts, historical background, and theoretical and practical aspects of bibliographic control; evaluation and methodology. Prerequisite: major standing.

LIS 502 Introduction to Information Science (3) Theory, understanding, and perspectives for the analysis of design and operation of information retrieval systems. Systems analysis applied to the process of information transfer. Consideration of user needs assessment, performance evaluation, and control of terminology.

LIS 503 Bibliographic Data Bases (4) Concepts and conventions of bibliographic record structure, file organization, and search protocols. Elementary techniques in the use of bibliographic utilities and on-line search services. Prerequisite: major standing.

LIS 510 Management for Librarianship (3) Management concepts critical to provision of library services. The planning process applied to library problems and opportunities. Communications awareness and skills in the professional environment. Organizational concerns, including personnel, budgeting, control techniques, theories of management, and evaluation of effectiveness.

LIS 511 Library Administration Skills (3) Provides practice in the administrative skills related to personnel selection, supervision, and management, and to planning and budgeting processes in the library setting. Topics include work specification, performance evaluation, personnel policy formulation, budget types, and budget preparation and control.

LIS 512 Community Analysis and Library Change (3) Review of the concepts, strategies, and tools for study of the community, response to community change, and promotion of desired library change. Includes experiential exercises, analysis of case studies, and investigation of the literature of relevant fields. Prerequisite: 500 or permission of instructor.

LIS 513 Management of Automated Systems in Libraries (3) Developing criteria for selection and design of computer systems for libraries and information centers. Applying criteria in evaluation of hardware and software. Examining related management challenges such as vendor relations, financing options, personnel requirements, and design of auxiliary activities. Credit/no credit only. Prerequisites: 501, 503, or permission of instructor.

LIS 520 Organization of Library Materials: Introduction (3) Principles and techniques of standard methods of organizing library materials for use. Includes fundamentals of descriptive cataloging, primary systems of subject analysis, and developments in technical services. Prerequisites: 501, 503, or permission of instructor; recommended: 500.

LIS 522 Descriptive Cataloging (3) Continuation of 520, with emphasis on rules of descriptive cataloging for monographic print materials of all kinds and nonbook materials. Includes applications of automation to bibliographic control of library materials. Prerequisite: 520 or permission of instructor.

LIS 523 Subject Analysis of Library Materials (3) Continuation of 520, with emphasis on subject analysis of library materials. Includes work with Library of Congress and Dewey decimal classifications, Sears and Library of Congress subject headings, and other systems used in libraries today. Prerequisite: 520 or permission of instructor.

LIS 525 Organization and Use of Serials (3) Management of serials, including acquisition and replacement, control, subject access, preservation, and use of all types in all kinds of libraries. Includes application of new technology and international developments as

they affect serials. Credit/no credit only. Prerequisite: 520 or permission of instructor. Recommended: 522.

LIS 526 Indexing and Abstracting (3) Techniques of vocabulary control and thesaurus construction as applied to indexing and abstracting processes. Design, selection, and evaluation of indexing systems. Computerized methods for free text, full text, and controlled vocabulary procedures. Application of methods to information retrieval systems. Credit/no credit only. Prerequisites: 501, 503, or permission of instructor.

LIS 527 Construction of Index Languages (3) Explanations of design options, features of index languages or thesauri, and criteria to use in their selection. After completing the thesaurus construction project, students are prepared to design index languages, plan and implement a design project, and evaluate index languages. Credit/no credit only. Prerequisite: 501, 502, 503 or permission of instructor.

LIS 528 Literature Searching (3) Concepts and techniques of professional literature searches, using a variety of standard search languages on representative types of bibliographic data bases and on-line reference resources. Analysis and evaluation of data bases. Prerequisite: 503 or permission of instructor; recommended: 501.

LIS 531 Conceptual Database Design (3) Preliminary design of data bases for decision support systems. Introduces methods of collecting user requirements, requirement analysis, data dictionary, the entity-relationship model, methods for data-base integration, preparation for data collection, and evaluation. Credit/no credit only. Prerequisites: 501, 503, or permission of instructor.

LIS 533 Bibliographic Knowledge Bases (3) Practical application of appropriate software for design of bibliographic databases and knowledge bases. Emphasis on creation of real working systems. Focus on bibliographic data structures, creation of indices and user interfaces. Considers approaches to artificial intelligence and expert systems with bibliographic data. Prerequisite: 503 or permission of instructor.

LIS 540 Materials for General Information Needs (3) Consideration of the individual in the generalized information environment. Interdisciplinary sources for the selection of library materials. Forms of materials for nonspecialized information retrieval and referral. Development of skills in question negotiation and search strategy. Prerequisite: 501, or permission of instructor; recommended: 500, 503.

LIS 541 Information Access in the Humanities (3) Description and analysis of information problems and information sources in the humanities. Fields considered are philosophy, religion, visual arts, performing arts, language, and literature. Prerequisite: 501 or permission of instructor; recommended: 500, 503.

LIS 542 Information Access in the Social Sciences (3) Description and analysis of information problems and information sources in the social sciences. Fields considered are anthropology, business economics, education, geography, history, political science, psychology, and sociology. Prerequisites: 501, 503, or permission of instructor.

LIS 543 Information Access in Science and Technology (3) Covers the following topics as they apply in the literature of the natural sciences and engineering: nature of information transfer; characteristics and organization of bibliographic and reference sources; information retrieval from manual and computer on-line sources; search strategy; practice with specific data bases and manual sources. Prerequisites: 501, 503, or permission of instructor; recommended: 528.

LIS 544 Legal Bibliography (3) Introduction to legal bibliography and law librarianship. Basic primary and secondary legal bibliographic tools. Integration of

manual and computer resources for effective legal research. Prerequisite: law librarianship major or 501 and 503 for non-law librarianship major. Offered: jointly with LAW A 598.

LIS 545 Government Publications (3) Government publications of the United States and foreign countries, their acquisition, organization, and use. Credit/no credit only. Prerequisites: 501, 503, or permission of instructor; recommended: 500.

LIS 546 Business Information Resources (3) Survey of the extent and nature of business information and its sources, and of business information producers and consumers. Study and use of both print and on-line sources. Prerequisites: 501, 503, or permission of instructor.

LIS 547 Evaluation and Selection of Audiovisual Materials (3) Develops competency in applying criteria to the evaluation, selection, and use of audiovisual materials and their accompanying technologies. Focuses on previewing the full range of audiovisual formats found in all types of libraries.

LIS 548 Children's Materials: Evaluation and Use (3) Study of library materials for children with emphasis on literature in its various forms. Attention also given to criteria used in evaluation, issues in selection, and use of materials with children.

LIS 550 Youth Materials: Bibliography and Resources (3) Sources of information about youth materials. Includes reviewing journals, selection aids, general and subject bibliographies, books of readings and criticism, textbooks, and biographical tools. Emphasis on the critical evaluation of these sources. Includes brief history of children's literature and the function of special collections. Prerequisite: 503 or permission of instructor.

LIS 551 Young Adult Materials: Evaluation and Use (3) Reading, evaluation, and sharing of literature currently appropriate to the needs, interests, and abilities of young adults, ages twelve through twenty. Application of criteria to the assessment of young adult reading materials and consideration of the uses of these materials with young people.

LIS 553 Information Access in Health Sciences (3) Characteristics of users of biomedical literature. Information resources in health sciences and health-care planning. Use of information retrieval systems, emphasizing services of National Library of Medicine. Organization of medical, hospital libraries. Problems of information policy, professional standards, certification. Credit/no credit only. Prerequisite: 528 or permission of instructor; recommended: 543.

LIS 555 Socioeconomic Data Resources (3) Utilization of public data bases of economic and demographic statistics for information retrieval, with special attention to services of Bureau of the Census. Application of on-line data files to library reference services. Credit/no credit only. Prerequisites: 528 and 599 or knowledge of inferential statistics, or permission of instructor.

LIS 557 Advanced Legal Bibliography (4) Legal bibliographic tools that answer more complex legal research problems, such as federal legislative histories, sources of administrative law, specialized research (e.g., tax, securities). Builds on skill, techniques utilized in 544. Extensive work with computer-assisted legal retrieval. Prerequisite: major standing in law librarianship, 544, or permission of instructor. Offered: jointly with LAW A 599.

LIS 558 Selection and Processing of Law Library Materials (3) Study of tools for collection development and collection development plans in law libraries. All law library technical processes, including acquisitions, budgeting, cataloging, and serials. Credit/no credit only. Prerequisite: 544 or permission of instructor.

LIS 560- User Education: Issues and Practice (3-, max. 6) User education as professional activity in libraries. Teaching methods, instructional design, special populations, learning styles, impact of technology, critical thinking skills. Practical teaching experience through University of Washington Libraries' user education program. Material covered over two consecutive quarters. Credit/no credit only. Prerequisites: 501 and 503. Recommended: one reference course.

LIS 561 Serving Individual Information Needs (3) Training in awareness and skills for perceiving and responding to the information requests of users. Effective strategies for meeting information needs are learned through use of simulations, role playing, experiential exercises, discussion, and practice. Credit/no credit only. Prerequisite: 500 or permission of instructor.

LIS 562 Planning for Library and Information Services (3) Principles underlying library and information services, and the selection and design of services to meet user needs in all types of libraries and information centers. Emphasis on adult clientele in academic, public, and special libraries, but attention given to school library media centers and all age levels. Prerequisite: 500 or permission of instructor; recommended: 501.

LIS 563 Services for Special Groups (3) Needs analysis and design of library services for the blind and visually handicapped, deaf and hearing impaired, institutionalized, mentally and physically handicapped, functionally illiterate, minorities, and aging. Skills, insights, and knowledge to work with these groups. Current research, practice, and experimental programs. Prerequisite: 500 or permission of instructor; recommended: 562.

LIS 566 Special Librarianship (3) Seminar in the practice of special librarianship in business and industrial firms, government agencies, and the free-lance sector. User services and information resources. Credit/no credit only. Prerequisites: 24 credits in Master of Librarianship program.

LIS 567 Public Library Services for Youth (3) Administration of youth departments in public libraries; planning and promoting programs and services; evaluation of library collections; community and professional roles of the youth librarian. Prerequisite: 500 or permission of instructor.

LIS 568 Administration of the School Library Media Program (3) Develops competency in administering materials, equipment, and services of the library media program as an integral part of the educational process of the school. Focuses on developing skills in acquiring, organizing, and managing the full range of

learning resources for access and use, and communicating the program to users. Required for school library media specialists.

LIS 571 Storytelling: Art and Techniques (3) Storytelling, past and present, noting its development as an art form. Reading and analyzing storytelling materials (folk literature and literary forms) used by storytellers throughout historical periods. Learning essential techniques necessary to maintain this artistic skill in a professional field. Planning storytelling programs for various age and interest groups and situations, utilizing folk, classic, and contemporary literature.

LIS 572 Archival and Manuscript Services (3) Selection, organization, and uses of archival and manuscript collections. Emphasis on the principles and techniques; some attention to the administration of state archival and historical institutions' collections. Lecture, demonstration, and laboratory. Prerequisite: 501, or permission of instructor.

LIS 577 Law Library Administration (4) Administration in law libraries, including organization, personnel, and management issues (e.g., interviewing, hiring, firing), communications, library planning, and book-keeping. Credit/no credit only. Prerequisite: 544 or permission of instructor.

LIS 581 Intellectual Freedom in Libraries (3) Analysis of issues related to intellectual freedom, with particular attention to implications for libraries and librarians. Includes consideration of the current legal climate, conformity versus freedom in the modern world, the librarian as censor, social responsibility and individual freedom, the intellectual freedom of children, prospects for the future. Credit/no credit only. Prerequisite: 500 or permission of instructor.

LIS 583 Cooperative Information Systems (3) Analysis of cooperative information systems found among all types of libraries and information centers. Emphasis on developments in the United States and also treatment of foreign and multinational systems, with assessment of their contributions. Prerequisite: 500 or permission of instructor; recommended: 501.

LIS 584 Information Policy (3) Review of efforts to develop national information policy and assessment of where we are in process. Consideration of legislation and issues pertinent to national information policy (e.g., freedom of information, privacy, copyright, management of government information, telecommunications, transborder data flow, and satellite technology). Prerequisites: 500, 503, or permission of instructor; recommended: 501, 545.

LIS 585 Information In the Public Policymaking Process (3) Demystifying information base for

policymaking in a democracy. Review of theoretical needs and opportunities for input of information associated with three branches of government and each phase of policymaking. Focus on actors who bring information to policymakers. Federal, state, and local comparison. Credit/no credit only. Prerequisite: 500 or permission of instructor; recommended: 501, 503.

LIS 590- Directed Fieldwork (4-) Library and information science majors only. A minimum of 200 hours of professional, supervised fieldwork in a library or professional information agency. May be taken in one quarter or as many as three consecutive quarters. Credit/no credit only. Prerequisite: 33 credits in Master of Librarianship program.

LIS 592 Aspects of Publishing (3) Examination of selected topics in book and periodical publishing from Renaissance through present. Focus on publishing practices, processes, and strategies in given economic, cultural, and social contexts. Covers the combination of activities, entrepreneurial or otherwise, that constitute publishing but not the technical means involved in producing the published product.

LIS 593 Preservation and Conservation of Library Materials (3) Consideration of the many factors contributing to the physical vulnerability of library materials of all kinds and an overview of resources and strategies for those who determine preservation policy or manage the application of such policy. No technical background necessary.

LIS 594 Collection Development (3) Access to materials as context for development and management of library collections in academic, public, school libraries. Community analysis, library mission; collection development policies, criteria, principles, levels, responsibilities; aids to selection; collection evaluation, use studies; controversial, difficult materials. Major issues, research, trends. Prerequisites: 500, 501, 503, or permission of instructor; recommended: course in 540 sequence.

LIS 598 Special Topics in Librarianship (3) Seminar dealing with various topics in librarianship. Offered by visitors or resident faculty. Topics are changed from quarter to quarter. May not be offered every quarter. May be repeated for credit. Credit/no credit only. Prerequisite is determined by specific course.

LIS 599 Methods of Research in Librarianship (3) Introduction to research methods commonly used in library and information science. Emphasis on problem selection, study design, data interpretation, and dissemination of results.

LIS 600 Independent Study or Research (*) Credit/no credit only.

LIS 700 Master's Thesis (*) Credit/no credit only.

School of Medicine

Dean

Philip J. Flalkow
C314 Health Sciences

Associate Deans

John B. Coombs
Bruce C. Gilliland
Robert J. Gust
D. Daniel Hunt
Lee L. Huntsman
Eric B. Larson
James P. LoGerfo
John M. Neff
Charles B. Smith

Assistant Deans

Joseph Chu
Carol F. MacLaren
Thomas E. Norris
Werner E. Samson

WAMI Coordinators / Assistant Deans

Michael J. Dimino, University of Alaska
Stephen J. Guggenheim, Montana State University
Michael B. Laskowski, University of Idaho and Washington State University

Established in 1946, the School of Medicine is the only medical school directly serving the states of Washington, Alaska, Montana, and Idaho (WAMI). Located in the Warren G. Magnuson Health Sciences Building, the School operates a decentralized program of medical education (WAMI) via a regional network of teaching affiliates.

The School's basic science departments provide educational opportunities for students from all schools and colleges within the University. Clinical teaching programs are conducted at the University of Washington Medical Center, Harborview Medical Center, Children's Hospital and Medical Center, and the Seattle Veterans Affairs Medical Center, as well as at other clinical affiliates in Seattle and throughout the WAMI states.

The School admits 166 medical students to its first-year class and has a total enrollment of about 700 students pursuing the Doctor of Medicine degree. The full-time faculty numbers nearly 1200 members. The affiliated University residency training network enrolls approximately 600 house officers. Enrollment in the graduate programs in the basic sciences exceeds 400 students, and approximately 800 postdoctoral fellows are enrolled in various advanced training programs. The School has baccalaureate and graduate programs in occupational therapy, physical therapy, physician assistant, prosthetics and orthotics, and medical technology. It participates in training a broad spectrum of other allied health professionals.

Academic Programs

Doctor of Medicine

Upon completion of the curriculum of the School of Medicine, the M.D. degree is awarded to those candidates who (1) have given evidence of good moral character, (2) have satisfactorily completed the requirements of the curriculum, (3) have fulfilled all special requirements, and (4) have discharged all indebtedness to the University.

Bachelor of Clinical Health Services

Candidates for the Bachelor of Clinical Health Services degree must be admitted to the University of Washington at the junior year level. They will pursue a seven-quarter sequence of prescribed studies in the MEDEX Northwest Physician Assistant program. Admission to the professional training program is via a competitive process administered by the MEDEX Northwest program within the School of Medicine. Because of the program's emphasis on prior medical experience, the great majority of applicants are working adults who have completed their pre-professional undergraduate course work at other colleges and universities throughout the Northwest.

Matriculation in the bachelor's degree pathway is dependent upon both admission to the University and acceptance by the MEDEX Northwest program. Students who are accepted by the MEDEX Northwest program for physician assistant training who are not admissible to the University will be classified as nonmatriculated students. They will earn official University credits and receive a certificate upon completion of the program.

MEDEX Northwest Certificate Program

MEDEX Northwest is a program designed to train physician assistants. It provides primary-care, midlevel practitioners by training medical personnel with prior clinical experience. A fully accredited physician assistant program conforming to standards developed and administered by the American Medical Association, MEDEX Northwest places 66 students annually in a variety of sites in Washington, Alaska, Idaho, Montana, and Oregon.

MEDEX Northwest is a seven quarter program. The first three quarters consist of intense clinical and didactic instruction at the University. The final four quarters are spent in clinical experiences outside the University. Six months are spent in a variety of inpatient and outpatient clinical rotations and the remaining six months are spent in a family practice preceptorship. The preceptorship is an on-the-job experience tailored to the practice of individual primary-care physicians and emphasizes diagnosis and treatment. At the completion of the program, students are eligible to sit for the national certifying examination for physician assistants. Besides the full-time program, MEDEX offers a part-time option which takes three years to complete.

Special Requirements

Applicants must have a minimum of two years recent, full-time, hands-on experience in the direct delivery of medical care to patients. Applicants must have completed two college-level English composition courses, and two college-level science courses, which must include at least 10 quarter credits in human anatomy and physiology, plus one other science course in a discipline relevant to medicine.

Correspondence and Information

MEDEX Northwest, Physician Assistant Program,
Box 354725
(206) 548-2600

Bachelor of Science

Programs leading to a baccalaureate degree with a major in microbiology are offered through the College of Arts and Sciences. Those programs are described in the College of Arts and Sciences section of this catalog.

Bachelor of Science in Medical Technology

A curriculum in medical technology is offered by the Department of Laboratory Medicine. This program provides study in the basic sciences plus clinical laboratory training designed to prepare competent laboratory

scientists for varied employment opportunities. Information concerning admission to the medical technology program appears under Laboratory Medicine in this catalog.

Bachelor of Science in Occupational Therapy

A curriculum in occupational therapy leading to a Bachelor of Science is offered by the Department of Rehabilitation Medicine. It provides professional training in the basic sciences and in the theory and practice of occupational therapy as it impacts *occupational performance* across the life span and in the various arenas of practice. *Occupation* refers to daily living skills that include self-care, work, and leisure/play. Information concerning admission to the occupational therapy program appears under Rehabilitation Medicine in this catalog.

Bachelor of Science in Physical Therapy

A curriculum in physical therapy is offered by the Department of Rehabilitation Medicine. It provides professional education in the basic sciences and in the clinical use of physical therapy evaluation and management strategies in the treatment or prevention of neuromusculoskeletal dysfunction. Information concerning admission to physical therapy appears under Rehabilitation Medicine in this catalog.

Bachelor of Science in Prosthetics and Orthotics

A curriculum in prosthetics and orthotics leading to the degree of Bachelor of Science is offered by the Department of Rehabilitation Medicine. It provides professional training in the basic sciences and the clinical application, design, and fabrication of prostheses and orthoses. Information concerning admission to the curriculum in prosthetics and orthotics may be found under Rehabilitation Medicine in this catalog.

Master of Science and Doctor of Philosophy

Work leading to master's and doctoral degrees is offered, in accordance with the requirements of the Graduate School, in the departments of Biochemistry, Bioengineering, Biological Structure, Immunology, Microbiology, Pathology, Pharmacology, and Physiology and Biophysics. Master's degree programs are offered by the departments of Laboratory Medicine, Medical History and Ethics, and Rehabilitation Medicine.

Students may work toward these degrees concurrently with the M.D. degree, taking additional years beyond the typical four-year medical curriculum. To expedite the training of physicians who wish to specialize in public health and community medicine, the School has available a program that leads simultaneously to the degrees of Doctor of Medicine and Master of Public Health. The program usually requires the addition of a fifth year to the medical education process. The quarters of the fifth year may be taken sequentially or interspersed with medical training in a variable pattern, subject to appropriate academic approval. Students may elect concentration in any of four departments of the School of Public Health and Community Medicine: Biostatistics, Environmental Health, Epidemiology, or Health Services.

Concurrent degrees are possible in many other departments and colleges of the University. Recent graduates have pursued concurrent degrees in education and engineering, as well as in the basic sciences of medicine and the School of Public Health and Community Medicine. A student who intends to work toward a graduate degree should confer with the Chairperson of the department in which graduate study is to be pursued and with the Associate Dean for Academic Affairs of the School of Medicine. Specific requirements for admission to work for advanced degrees appear in the Graduate School: Graduate Study section of this catalog. Permission to pursue advanced degrees is

granted to medical students only if they are progressing normally in the medical curriculum and show evidence of being able to take on this additional work load.

Doctor of Medicine

Admissions

(These procedures and policies described are subject to change. Information regarding changes is available from the School of Medicine Admissions Office.)

Selection Factors

Candidates for admission to the University of Washington School of Medicine are considered comparatively on the basis of academic performance, motivation, maturity, personal integrity, and demonstrated humanitarian qualities. A knowledge of and exposure to the needs of individuals and society and an awareness of health care delivery systems are desired. Extenuating circumstances in an applicant's background are evaluated as they relate to these selection factors.

Applicants must submit scores from the Medical College Admission Test (MCAT). This exam must be taken no later than the autumn of the year before matriculation and cannot be more than three years old at the time of matriculation. MCAT registration blanks are available through premedical advisers or through the Office of Admissions. Under exceptional circumstances, to be determined by the Admissions Committee, the GRE may be considered during the admissions process, however, if accepted, the applicant will be required to take the MCAT prior to matriculation.

The premedical course requirements must be completed before matriculation but preferably should be completed by the time of application. These are: A total of 32 semester hours or 48 quarter hours of undergraduate science courses divided into: a) *Chemistry*, 12 semester/18 quarter hours, which can be satisfied by taking any combination of inorganic, organic, biochemistry or molecular biology courses. b) *Physics*, 4 semester/6 quarter hours c) *Biology*, 8 semester/12 quarter hours d) *Other ("open") science subjects*, 8 semester/12 quarter hours, which can be met by taking other courses in any of the three categories above.

Under exceptional circumstances certain course requirements may be waived for individuals who present unusual achievements and academic promise. All candidates must demonstrate substantial academic ability in their major field as well as in the required science courses. Candidates should be proficient in the use of the English language and basic mathematics and are expected to have a basic understanding of personal computing and information technologies. It is strongly recommended that an understanding of the concepts underlying biochemistry or molecular biology be acquired prior to entering medical school. Those students who entered in the fall of 1995 had a mean GPA of 3.58 and the following mean MCAT scores: Verbal, 9.9; Physical Science, 10.2; and Biological Science, 10.2.

Completion of three years of course work at an accredited college or university is the minimum required before possible matriculation; however, 99 to 100 percent of entrants in recent years have earned bachelor's degrees. No specific major is advised. A broad background in the humanities and liberal arts is encouraged, indeed expected.

Application Procedure

The University of Washington participates in the American Medical College Application Service (AMCAS). The deadline for submitting an application to AMCAS is November 1. After receiving the application from AMCAS, the School of Medicine will ask qualified individuals to submit a \$35 application fee and supplemental application materials. Every attempt will be

made to notify applicants of the final action by the end of March.

Preference is given to legal residents of Washington, Alaska, Montana, and Idaho. Out-of-region African Americans, American Indians/Alaskan Natives, Mexican Americans, and mainland Puerto Ricans are encouraged to apply and to contact the Minority Affairs Program for additional information regarding student support services. Medical Scientist Training Program applicants will also be considered. Non-U.S. citizens, in addition to the above, also must have a permanent resident's visa. Applications from persons who have failed to meet minimum standards in another medical or dental school will not be considered.

The deadline for submitting the additional application materials is January 15. These supplemental materials include:

- (1) A supplemental application form. This will be sent to qualified applicants after the School of Medicine has received the AMCAS application.
- (2) A 300-word autobiographical statement in which the candidate describes the origin and development of his or her motivation to be a physician, the reasons for desiring to attend the University of Washington School of Medicine, and any other issues of importance to the candidate. The applicant may request that the Personal Comments section of the AMCAS application be used to fulfill this requirement.
- (3) A premedical committee letter of recommendation or three letters from instructors from whom the candidate has taken courses. These letters should be critical evaluations of the candidate's academic ability, strengths and weaknesses, the difficulty of course work undertaken, motivation for medicine, personal maturity, and special attributes and assets.
- (4) A \$35 fee. This will automatically be waived for those who have qualified for AMCAS fee waivers. Others seeking a waiver of this fee should submit their requests directly to the School of Medicine Office of Admissions.
- (5) Acknowledgment of having read, understood, and of being able to meet, with or without reasonable accommodation, the *Essential Requirements of Medical Education at the University of Washington School of Medicine: Admission, Retention and Graduation Standards* to be sent with the supplemental application form.
- (6) Conviction/Criminal History Information Form. Washington State law requires that all individuals who have access to children under 16 years of age, developmentally disabled people, and other vulnerable persons, disclose background information concerning crimes and offenses against these populations.

Candidates from Alaska, Montana, and Idaho will be required to submit residency certifications from their respective state certifying officers. Proof of legal residence for Washington residents also may have to be furnished. Determination of state of legal residence is not made by the School of Medicine; specific instructions regarding this requirement are furnished at the time of application. Those who enter as residents of Alaska, Montana, and Idaho are expected to spend their first year at the university site in their particular state. Twenty Washington students begin their medical education by spending the first year at Washington State University. Offers of acceptance, therefore, are conditional upon agreement to participate in the WAMI Program.

Inquiries, address changes, or other information regarding the application should be transmitted in writing and directed to the Committee on Admissions, Office of Admissions, Box 356340, School of Medicine, University of Washington, Seattle, Washington 98195-6340.

Minority Affairs Program

The Minority Affairs Program assists students from minority and/or disadvantaged backgrounds who are pursuing M.D. or M.D.-Ph.D. degrees. The program nurtures interests in medical careers by providing a variety of support services and enrichment activities in the areas of recruitment, education, admission, retention, and professional development.

The School actively recruits ethnic minority applicants, particularly those from African American, Mainland Puerto Rican, Mexican American, and Native American/Alaska Native backgrounds. While the School does target residents of the four WAMI states, underrepresented applicants from other states are encouraged to apply. Students should contact the Minority Affairs Program for assistance during the application process. The program offers counseling and advocacy, referrals to University and community resources, tutoring, financial aid information, and numerous opportunities to interact with other minority health care professionals within the community. Various student organizations also provide minority medical students a means to interact socially and pursue shared interests, to offer peer support, and to assist with student recruitment and community outreach activities.

U-DOC is a high school summer enrichment program offered by the Minority Affairs Program. It is a six-week program for students who have completed their junior year in high school. U-DOC's goal is to foster, affirm, and encourage high school students' interest in the medical profession by allowing them to further explore medical careers and to obtain a valuable introduction to college life.

The Western Consortium Minority Medical Education Program (MMEP) offers undergraduate and some qualified postbaccalaureate students a six-week summer academic enrichment program that includes science, mathematics, writing, study skills, and MCAT preparation. Structured clinical and research activities are also offered. Housing, stipends, and travel assistance are available.

A six-week Prematriculation Program for entering minority and disadvantaged medical students is offered during the summer. The program is designed to facilitate students' entry into medical school by providing instruction in histology as well as enrichment activities in areas such as study skills, stress management, test-taking skills, research, clinical practice, and community health. Stipends and travel assistance are available to students who qualify.

During the regular school year, the Minority Affairs Program serves as a general information resource for both the academic and nonacademic needs of students and facilitates students' access to the multiple resources in the School of Medicine, the WAMI region, and the community. Annual events include a Pre-Admission Workshop and a Cross-Cultural Medicine Workshop. A program of early acceptance called PATHWAYS has been established for outstanding minority and disadvantaged students from the WAMI region. PATHWAYS acceptance enables students to be accepted to the UW School of Medicine as early as their sophomore year in college.

The Native American Center of Excellence was established in 1992 as part of the Minority Affairs Program to encourage Native American students to pursue medicine as a career, to promote research on Native American health issues, and to foster the preparation of Native American students for faculty roles in academic medicine. The Center of Excellence provides educational experiences that integrate western medicine with the Native American way of life, offers a variety of support services to promote the academic development of students, and sponsors a variety of educational opportunities within the Native American community.

Inquiries and requests for additional information may be obtained by contacting the Minority Affairs Program, Box 357430, School of Medicine, University of Washington, Seattle, Washington 98195-7430; (206) 685-2489.

Medical Scientist Training (M.D.-Ph.D.) Program

A limited number of highly qualified candidates who wish to pursue both the M.D. and Ph.D. degrees are considered annually. Medical scientist trainees must be accepted by the School of Medicine for the M.D. degree and by the Graduate School for the Ph.D. degree. They are permitted a wide choice of research specializations from among numerous disciplines and interdisciplinary areas of biomedical sciences. The program emphasizes continuity of both clinical and basic sciences exposure. Among participating graduate departments and interdepartmental disciplines are biochemistry, bioengineering, biological structure, biostatistics, environmental health, epidemiology, genetics, immunology, the interdisciplinary molecular and cellular biology program, microbiology, molecular biotechnology, neurobiology, pathology, pharmacology, physiology and biophysics, and zoology.

Applicants should correspond directly with the Director of the Medical Scientist Training Program, C423 Health Sciences, Box 357470, University of Washington, Seattle, Washington 98195-7470; (206) 685-0762, as well as proceed with the regular School of Medicine application.

Applicants who wish to be considered for the M.D.-Ph.D. program must submit the Medical Scientist Training Program application as quickly as possible. Both the application and any supplemental material requested must be complete by January 15. This application form is sent to all eligible applicants together with acknowledgment of receipt of their medical school application. Serious consideration is rarely given to applicants with minimal research experience and either a cumulative GPA of less than 3.50 and/or MCAT scores of less than 10.

Financial Information

Fees and Other Charges

All fees and extra service charges are payable in United States dollars and due at the time specified for such fees and charges. The University reserves the right to change any of its fees and charges without notice. Resident tuition for 1996-97 is \$2,686 per quarter; nonresident tuition is \$6,824 per quarter.

Financial Assistance

All financial aid is based on the demonstrated need of the student. All applicants for aid from the school must submit data for an analysis of need using the Free Application for Federal Student Aid. This requires full disclosure of resources available to the student from individual and family sources. The Federal Direct Stafford Loan (subsidized and unsubsidized), Perkins Loan, and the Primary Care Loan are the primary sources of aid. Loans are also available from the School of Medicine provided students meet the need requirement that is based on both the student's and parent's financial information.

Partial scholarships are available through the School of Medicine scholarship fund. These awards are limited to students with exceptional financial need and require financial information from the student and the student's parents.

Financial aid information is distributed to all accepted applicants. Application forms for financial aid may be obtained from the UW Office of Student Financial Aid or the School of Medicine Financial Aid Office. Each year a deadline is set for receipt of the application by the processor, generally February 28. Applicants must meet this deadline to be considered for all available aid sources regardless of the status of their admission file.

In case of emergency or special need, an application for financial assistance may be made at any time.

Outside employment is discouraged while the student is enrolled in medical school course work.

Medical Curriculum

Basic Curriculum (122 Credits)

The first two years (six quarters) of the medical student curriculum is identified as the *Basic Curriculum*. It consists of three phases, or groups, of courses in the human biology series: pre-organ system courses in the sciences basic to medicine, organ systems taught by basic and clinical disciplines, and introduction to clinical medicine and health care. The first phase is designed to provide the background in basic disciplines required for the organ system courses. In the second phase, the student is concerned with learning the normal and pathophysiologic properties of the several human organ systems. Emphasis is placed upon correlating these properties with clinical methods of data collection and problem formulation. Students pursue the Introduction to Clinical Medicine course throughout all six quarters, learning to interview patients, obtain a medical history, and perform physical examinations. In the course Medicine, Health, and Society, they also study the health care system and problems of providing medical care to populations.

Students are expected to pursue the Basic Curriculum during their first six quarters in the School of Medicine. The academic demands of the Basic Curriculum are scaled so that most students also will be able to take elective courses. Electives are used to broaden the student's background.

First Quarter (Autumn)

HUBIO 510P Microscopic Anatomy (Histology)
HUBIO 511P Gross Anatomy and Embryology
HUBIO 512P Mechanisms in Cell Physiology
HUBIO 513P Introduction to Clinical Medicine
HUBIO 514P Biochemistry I-A
HUBIO 516P Systems of Human Behavior I-A

Second Quarter (Winter)

HUBIO 520P Cell and Tissue Response to Injury
HUBIO 521P Natural History of Infectious Disease and Chemotherapy I-A
HUBIO 522P Introduction to Clinical Medicine
HUBIO 523P Introduction to Immunology
HUBIO 524P Biochemistry I-B
HUBIO 526P Systems of Human Behavior I-B

Third Quarter (Spring)

HUBIO 530P Epidemiology
HUBIO 531P Head, Neck, Ear, Nose, and Throat
HUBIO 532P Nervous System
HUBIO 534P Natural History of Infectious Disease and Chemotherapy I-B
HUBIO 535P Introduction to Clinical Medicine

Fourth Quarter (Autumn)

HUBIO 540P Cardiovascular System
HUBIO 541P Respiratory System
HUBIO 542P Introduction to Clinical Medicine
HUBIO 543P Principles of Pharmacology I
HUBIO 544P Endocrine System
HUBIO 546P Systemic Pathology
HUBIO 554P Genetics
HUBIO 567P Skin System

Fifth Quarter (Winter)

HUBIO 550P Introduction to Clinical Medicine

HUBIO 551P Gastrointestinal System
HUBIO 552P Hematology
HUBIO 553P Musculoskeletal System
HUBIO 555P Medicine, Health, and Society

Sixth Quarter (Spring)

HUBIO 560P Introduction to Clinical Medicine
HUBIO 562P Urinary System
HUBIO 563P Systems of Human Behavior II
HUBIO 564P Principles of Pharmacology II
HUBIO 565P Reproduction

Clinical Curriculum (144 Credits)

The clinical curriculum is pursued predominantly in the third and fourth years of medical school. It includes three elements: prescribed clerkships to be completed by all students (72 credits or thirty-six weeks in medicine, obstetrics and gynecology, pediatrics, psychiatry, and surgery); a clinical selective series requiring a minimum number of credits (24) in three clinical areas (family medicine, rehabilitation medicine/chronic care, and emergency care/trauma); and a minimum of 48 credits of clinical clerkships elected by the student.

Education in the clinical curriculum utilizes the case-study method. Students gain clinical knowledge and gradually increase their clinical problem-solving abilities while working as junior members of a medical care team. Each such team is headed by a faculty clinician working in one of the medical school-affiliated hospitals or practice units.

Independent Study in Medical Science

In addition to the basic and clinical curricula, each student must complete 10 credits in courses, independent study, and investigation in one or more of the biological, behavioral, sociocultural, or epidemiological sciences basic to medicine. The purpose of this requirement is that the student gain an understanding of the philosophy and methods of science. Of the 10 credits, 6 are earned by the satisfactory completion of a project in Independent Study in Medical Science (ISMS) that includes a written paper. The remaining 4 may be satisfied by taking 500-level courses in a variety of subjects at any time during the student's enrollment in the M.D. program.

WAMI Program

The WAMI Program was initiated in 1971 as an experiment in decentralized medical education to provide a broader range of educational opportunities for students, and to address the need for primary-care physicians oriented toward rural practice. It is an integral part of the undergraduate medical curriculum and is a fully accredited program of the School of Medicine. The WAMI Program is named for the four states (Washington, Alaska, Montana, and Idaho) that share resources and responsibilities in the regional educational program. Funds appropriated to the WAMI Program by Alaska, Montana, and Idaho legislatures assure each state of positions in the entering medical class each year for its students.

First-Year Training

In the first year of the WAMI Program, approximately forty percent of the students admitted to the University's School of Medicine receive the first year of medical school training at Washington State University, the University of Alaska, Montana State University, or the University of Idaho. Washington State University positions not filled by volunteers are assigned by lottery. Every Washington resident applicant should recognize the possibility of assignment to Washington State University during the first year. Alaskans, Montanans, and Idahoans attend their home-state institutions. While in one of these institutions, they enroll in basic science courses taught by the science faculty and are provided supplemental resources from this University's School of Medicine faculty. These students

join their classmates at the University's campus in Seattle for the second year of medical studies.

Third-Year Training

At the conclusion of the second year, students enter that portion of the curriculum that is predominantly clinical. As part of the clinical training, they complete clerkships at the University of Washington, at its affiliated hospitals, or at Community Clinical Units located in the four-state region. At these sites, physicians in practice serve as School of Medicine clinical faculty members to provide supervised clinical training in six specialties: family medicine, internal medicine, obstetrics and gynecology, pediatrics, psychiatry, and surgery. The WAMI Community Clinical Units are also used for a portion of the residency training in the respective disciplines. Training experiences at the WAMI Community Clinical Units include outpatient contact at local physicians' private offices, hospital rounds, follow-through inpatient care, emergency room duty, service at local community special clinics, lectures, and didactic and participatory discussions.

By capitalizing on the resources of neighboring state universities, the clinical expertise of community practitioners, and the medical center, the WAMI Program has been able to expand medical school admissions for students from all four states, to enlarge clinical training opportunities in the primary-care disciplines, and to address the shortage of physicians in rural areas.

Enrichment Opportunities

Students may enhance their medical education through a variety of sponsored activities that offer students an opportunity to explore areas of special interest, such as working in rural or urban clinics that serve medically underserved communities, undertaking medical research projects or clinical investigations, or participating in an international exchange program with a developing country. Brief descriptions of three of the more formally structured programs follow. Information on other opportunities may be obtained from the Academic Affairs Office.

Rural/Underserved Opportunities Program (RUOP)

This program exposes students to rural medicine and utilizes clinical training sites in all four states. For one month during the summer between the first and second year, students work with physicians in small communities, offering a chance to better understand the challenges and opportunities in these settings. Students receive a stipend supported by the Family Health Foundation, the Academy of Family Physicians, Area Health Education Centers, and the School of Medicine.

Medical Student Research Training Program

Research opportunities are offered to UW medical students interested in gaining valuable experience from training in medical research. The purpose of the program is to encourage students to participate in a research project as part of their medical education. This research is planned and carried out under the supervision of a faculty sponsor and may be undertaken during any quarter. Student trainees in the program receive a stipend supported largely by a special fund from the School of Medicine. The project is expected to be twelve weeks, full-time, on a working schedule of forty hours per week, and the student may not be enrolled in courses for credit during this time.

Medical Thesis Program

The medical thesis program of the School of Medicine is voluntary, and participation is initiated by the student. Often a student will develop a special interest in some particular field in medicine. This interest may create a desire to do more in-depth research to learn more about the field. The thesis program is a means of fulfilling that desire. The medical thesis represents work of original and superior scientific merit that is

conducted independently by the student. A faculty committee reviews the theses submitted by medical students. Additional information concerning the thesis program can be obtained from the School of Medicine Academic Affairs Office.

Student Evaluation and Promotion

The awarding of the Doctor of Medicine degree is contingent upon satisfactory completion of academic and non-cognitive requirements. The latter includes the acquisition of behavioral patterns and attitudes consistent with the oath that all students take at the time of graduation. As such, student evaluation is based upon the faculty's observation of the student's behavior and conduct as well as papers and examinations. Every student is required to pass Steps 1 and 2 of the United States Medical Licensing Examination, all University of Washington examinations, and complete an approved Independent Study in Medical Science project before receiving the Doctor of Medicine degree. Periodic review of student performance is conducted by the School's Student Progress Committee. Students are informed of their deficiencies and the remedial requirements, if any, for these deficiencies. Dismissal from the School may occur if the student fails to maintain an acceptable academic record, fails to follow academic directives provided by the School's committees, or fails to develop attitudes and behavioral patterns appropriate to a career in medicine. The Faculty Council on Academic Affairs reviews the Student Progress Committee's actions, and the Dean of the School of Medicine has final approval of the committee's and council's recommendations. A review mechanism is available within this process. Once dismissal or withdrawal from the School has occurred, the student may petition for reinstatement through the Faculty Council on Academic Affairs. Reinstatement will not be considered without substantial evidence that the problems causing the dismissal or withdrawal have been resolved. Only one reinstatement petition through the Faculty Council on Academic Affairs is allowed. If more than one year elapses after the withdrawal or dismissal, the individual may be required to apply for readmission through the admissions process. If a reinstatement petition is denied, subsequent requests for admission must be directed through the standard admissions procedures.

Grading System

The grades awarded in each course in the M.D. curriculum are Honors, Satisfactory, or Not-Satisfactory. The School's goal is to provide a curriculum that defines the competencies to be achieved by the student at each level. Therefore, grading usually signifies satisfactory or not satisfactory accomplishment of these competencies at the end of each course. However, a pattern of documented evaluator concerns about a student's performance may indicate not satisfactory performance when the record is viewed as a whole, even though passing grades have been assigned. Honors may be awarded in a course on predetermined criteria that may involve additional work in the subject as selected by the student. The grading system precludes the ranking of students in class standing by a grade-point average.

The School of Medicine reserves the right to revise or modify the curriculum, system of evaluation, or graduation requirements.

Honors

A charter as Alpha of Washington was granted to the School of Medicine in 1950 by Alpha Omega Alpha, the honorary medical society. Members are elected by the membership of Alpha Omega Alpha on the basis of high scholarship and good moral character.

Graduation With Honors

A degree of Doctor of Medicine with Honors may be awarded to students with high achievement who, in addition, have demonstrated initiative and success in clinical and scholarly pursuits related to medicine.

Candidates for graduation with honors are nominated by the departments each year and are selected on the basis of a review of their academic records by the Honors and Awards Committee.

Graduate Medical Education and Postdoctoral Training

The University of Washington School of Medicine offers a broad array of residency and fellowship programs. Training occurs at the University of Washington Medical Center, Harborview Medical Center, Seattle Veterans Affairs Medical Center, Children's Hospital and Medical Center, and other affiliated training sites throughout the region. Postdoctoral research fellowship opportunities in the basic sciences are also offered.

Continuing Medical Education

The Office of Continuing Medical Education, School of Medicine, offers a wide variety of courses for physicians and health care professionals in the Pacific Northwest and throughout the nation.

Offerings include short courses of one to three days, one- to two-week board review courses, visiting professorships, preceptorships, and mini-residencies. Other offerings include lecture series at hospitals, video tape presentations, self-directed instructional materials, and other specific courses requested by members of the medical community throughout the WAMI region.

All physicians also are invited to participate in continuing medical education programs offered by clinical departments, such as grand rounds and regular conference series.

The University of Washington School of Medicine is accredited by the Accreditation Council for Continuing Medical Education to sponsor Continuing Medical Education for physicians. All programs sponsored by the Office of Continuing Medical Education are applicable to physician relicensure requirements of the Washington Board of Medical Examiners and for Category I credit of the Physician's Recognition Award of the American Medical Association. Prescribed credit for the American Academy of Family Physicians and other types of credit are included in the program offerings when appropriate.

Brochures and calendars for courses are available for more detailed information. For information concerning Continuing Medical Education programs, contact: University of Washington School of Medicine, Office of Continuing Medical Education, Box 358220, 1325 4th Avenue, Suite 2000, Seattle, Washington 98101-8220. Telephone number: (206) 543-1050 or 1-800-869-2633.

Anesthesiology

BB1459 Health Sciences

The Department of Anesthesiology maintains an active program of teaching and research for the specialist and nonspecialist. Medical students are introduced to the principles of anesthetic management and the effects of anesthetic agents on circulatory and respiratory physiology. The clinical clerkship program provides basic training in airway management and care of the unconscious patient. A three-year residency program is available for physicians who desire specialty training in anesthesiology. In addition, advanced clinical and research training is offered in several major subspecialty areas (cardiac anesthesia, neuroanesthesia, pediatric anesthesia, obstetrical anesthe-

sia, pain management, regional anesthesia). Opportunities for collaborative research are available to undergraduate and graduate students. The department conducts a regular series of clinical conferences, didactic lectures, and research seminars. Questions regarding clinical clerkships may be directed to Dr. Jeremy Geiduschek at 526-2518. Other training questions may be directed to the Residency Coordinator at 543-2773.

Faculty

Chair

Frederick W. Cheney

Professors

Artru, Alan A. 1980; MD, 1975, Medical College of Wisconsin.

Bashein, Gerard * 1974; PhD, 1969, Carnegie-Mellon University; MD, 1974, University of New Mexico.

Bishop, Michael J. 1979; MD, 1974, University of California (San Diego).

Byers, Margaret R. * 1972, (Research); PhD, 1969, Harvard University; somatosensory receptor structure, cytochemistry, and pathologic reactions; neuroimmune interactions.

Chapman, C. Richard * 1971; PhD, 1969, University of Denver; human pain measurement, psychophysiology, sensation and perception, chronic pain.

Cheney, Frederick W. 1967; MD, 1960, Tufts University.

Cullen, Bruce F. 1984; MD, 1966, University of California (Los Angeles).

Fink, B. Raymond 1964, (Emeritus); MD, 1938, University of London (UK).

Freund, Felix G. 1963, (Emeritus); MD, 1948, University of Buenos Aires (Argentina).

Freund, Peter 1980; MA, 1971, Brown University; MD, 1975, Columbia University; temperature regulation, vasomotor control, physiology/biophysics.

Hornbein, Thomas F. * 1963; MD, 1956, Washington University; physiology, biophysics.

Kenny, Margaret * 1970, (Adjunct); PhD, 1968, University of Illinois; clinical chemistry, new technologies for in vivo clinical biochemical analysis.

Lam, Arthur M. 1986; MD, 1974, Western Ontario University (Canada); neuroanesthesia.

Lecky, John H. 1988; MD, 1965, University of Pennsylvania.

Loeser, John D. 1969; MD, 1961, New York University; pain, neurophysiology.

Lynn, Anne 1981; MD, 1975, Stanford University; anesthesiology.

Martin, Roy W. * 1971, (Research); PhD, 1975, University of Washington; bioinstrumentation, ultrasonic Doppler, echo, tissue characterization, signal processing.

Murray, Jeffrey P. 1980; MD, 1974, University of Rochester.

Murphy, Terence M. 1968; MBChB, 1961, University of Liverpool (UK).

Pavlin, Edward G. 1973; MD, 1968, University of Manitoba (Canada).

Pearlman, Alan S. 1978, (Adjunct); MD, 1970, Harvard University; cardiology.

Ready, Laurence Brian 1977; MD, 1967, University of Saskatchewan (Canada).

Slattery, John T. * 1978, (Adjunct); PhD, 1978, State University of New York (Buffalo); pharmacokinetics/pharmacodynamics of alkylating agents, oncology/bone marrow transplant/gene therapy.

Townes, Brenda D. * 1961, (Adjunct); PhD, 1970, University of Washington; psychology.

Ward, Richard J. 1963, (Emeritus); MD, 1949, St Louis University.

Associate Professors

Bernards, Christopher M. 1988; MD, 1984, Oregon Health Sciences University.

Bowdle, T. Andrew 1981; MD, 1980, PhD, 1983, University of Washington; anesthesiology.

Buckley, F. Peter 1977; MBBS, 1968, St Bartholomew's Hospital Medical School (UK).

Butler, Stephen H. 1975; MD, 1966, University of Toronto (Canada).

Chabal, Charles 1985; MD, 1982, University of Pittsburgh.

Chadwick, Heathcliff S. 1980; MD, 1976, University of Oregon.

Clarke, William R. 1988; MD, 1979, Duke University.

Colley, Peter S. 1973; MD, 1967, University of Vermont.

Domino, Karen B. 1986; MA, 1974, University of New Mexico; MD, 1978, University of Michigan; neuroanesthesia.

Dong, Willie K. * 1976, (Research); PhD, 1974, University of California (San Francisco); function and structure of neural pain mechanisms and pain behavior.

Edwards, William T. 1990; PhD, 1968, Massachusetts Institute of Technology; MD, 1975, University of Massachusetts.

Egan, Kelly J. 1980; MA, 1968, Texas Technological University; PhD, 1980, University of Washington; clinical psychology.

Glosten, Beth 1992; MD, 1983, University of Washington.

Haberkern, Charles M. 1988; MD, 1974, Columbia University; anesthesiology.

Jacobson, Louis 1985; MBChB, 1973, University of Capetown (South Africa); pain and regional anesthesia.

Jardine, David 1987; MD, 1980, Johns Hopkins University.

Kharasch, Evan D. * 1984; PhD, 1983, MD, 1984, Northwestern University; clinical pharmacology of anesthetic agents, drug metabolism, and drug interactions.

Mayberg, Teresa Slee 1983; MD, 1983, University of Washington.

O'Rourke, Patricia Pearl 1988; MD, 1975, University of Minnesota; anesthesiology.

Pavlin, D. Janet 1975; MD, 1969, University of Manitoba (Canada).

Posner, Karen L. 1986, (Research); PhD, 1990, University of Washington.

Rooke, G. Alec 1982; MD, 1980, University of Washington; cardiac anesthesia.

Ross, Brian K. 1983; MS, 1973, Idaho State University; PhD, 1975, University of North Dakota; MD, 1983, University of Washington.

Schwid, Howard A. 1986; MD, 1982, University of Wisconsin.

Sharar, Samuel R. 1983; MD, 1983, University of Washington.

Sivarajan, Murali 1974; MBBS, 1967, Jawaharlal Institute of Postgraduate Medical Education & Research.

Sorensen, Gregory K. 1982; MD, 1978, University of Nebraska.

Spiess, Bruce D. 1990; MD, 1980, Rush Medical College.

Tyler, Donald C. 1977; MD, 1970, University of Pennsylvania; anesthesiology, pediatrics.

Unadkat, Jashvant D. * 1985, (Adjunct); PhD, 1982, University of Manchester (UK); mechanisms of transport of anti-HIV drugs across placenta, CSF-blood barrier, and intestine.

Assistant Professors

Bratton, Susan L. 1990; MD, 1987, University of Arkansas; pediatric care.

Coda-Chambers, Barbara 1984; MD, 1984, Yale University.

Cooper, Jeremy Ormond 1987; MBChB, 1980, University of Auckland (New Zealand).

Deem, Steven A. 1992; MD, 1984, Southern Illinois University; critical care.

Dunbar, Peter J. 1991; MBChB, 1978, University of Aberdeen (UK).

Fitzgibbon, Dermot R. 1992, (Acting); MBChB, 1983, Cork Regional Hospital; pain management.

Gavrin, Jonathan R. 1991; MD, 1978, Dartmouth College; pain management.

Geiduschek, Jeremy M. 1983; MD, 1983, Vanderbilt University.

Gillies, Bruce S. 1989; MD, 1984, University of Rochester.

Gunn, Holly C. 1991, (Acting); MD, 1990, University of Pennsylvania.

Jacobson, Lawrence 1985; MD, 1979, University of Michigan.

Karl, Helen W. 1990; MD, 1976, University of Virginia.

Mackie, Kenneth P. 1987; MD, 1984, Yale University.

Martin, Lynn D. 1994; MD, 1982, University of Washington; pediatric anesthesiology.

Ramamoorthy, Chandra 1991; MBBS, 1978, Jawaharlal Institute of Postgraduate Medical Education & Research.

Rapp, Suzanne E. 1984; MD, 1981, University of Washington.

Sasaki, Steven 1990; PhD, 1990, University of Washington.

Strauss, Susan G. 1987; MD, 1984, Chicago Medical School.

Terman, Gregory W. 1987; MA, 1981, PhD, 1985, University of California (Los Angeles); MD, 1987, University of Miami (Florida).

Van Norman, Gail 1986, (Acting); MD, 1981, University of Washington.

Williams, Glyn D. 1988; MBChB, 1976, University of Rhodesia.

Wright, Ian H. 1990; MBBS, 1980, University of London (UK).

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Course numbers with a P suffix are not graduate courses and are restricted to medical student enrollment only.

ANEST 498 Undergraduate Thesis (*) *Geiduschek* By special arrangement. Time and credit to be arranged. Offered: AWSps.

ANEST 499 Undergraduate Research (*) *Geiduschek* Specific research problems relating to pulmonary, cardiovascular, renal, obstetric, and central nervous system functions, and their alteration by anesthetic techniques and agents. (Six weeks, full-time. Limit: two students.) Offered: AWSps.

ANEST 501P Preceptorship in Anesthesiology (1)
Geidushek An opportunity for first- and second-year medical students to gain experience with medical practice situations by observing clinical faculty members in their offices. Prerequisite: permission of instructor. Offered: AWPSP.

ANEST 680P Basic Anesthesia Clerkship (4)
Geidushek Introduction to the principles of airway management, ventilatory support, use of local anesthetics, techniques of patient monitoring and fluid therapy. Skills taught include airway management, venipuncture, lumbar puncture and endotracheal intubation. Prerequisite: third- or fourth-year student. (Two weeks, full-time. Limit: three to five students each two-week period.) Affiliated hospitals. Offered: AWPSP.

ANEST 681P Advanced Clerkship in Anesthesiology (8)
Geidushek Clerkship for students desiring greater exposure to anesthesiology as a specialty. Individual programs can be arranged in the following areas: surgical anesthesia, obstetrical anesthesia, and pain clinic. Prerequisite: 680P or permission of instructor. (Four weeks, full-time. Limit: two students per period.) Affiliated hospitals. Offered: AWPSP.

ANEST 697P Anesthesiology Special Electives (*, max. 24)
Geidushek Special clerkships, externships, or research opportunities can at times be made available at institutions other than the University of Washington. Students wishing to elect this course should obtain a special assignment form from the Dean's office at least one month before advance registration. Prerequisite: permission of instructor. (Six to twelve weeks, full-time.) Offered: AWPSP.

Biochemistry

J405 Health Sciences

Stephen Hauschka, Graduate Program Coordinator

Modern biochemistry involves the study of biological processes at a molecular level. Specific research projects may entail study in such diverse fields as molecular biology, molecular biophysics, genetics, microbiology, immunology, developmental biology, organic chemistry, pharmacology, and physiology. Graduate students enrolled in the Department of Biochemistry engage in studies and research that prepare them for the challenging opportunities open to the professional biochemist/molecular biologist in colleges and universities, research institutes, medical schools and hospitals, government laboratories, and the laboratories of chemical, biotechnology, and pharmaceutical industries.

The course of advanced study is designed to give each student a firm foundation upon which to base further professional progress. In the first year of academic work, students attend courses in biochemistry and molecular biology, and in related fields such as chemistry, biophysics, genetics, cell biology, and microbiology. In the second and succeeding years, an increasing amount of time is devoted to research and independent study. For the Ph.D. degree, each student is required to gain teaching experience, usually during the second year of the graduate program.

An accredited major in biology, chemistry, or biochemistry fulfills admission prerequisites. Students with other majors are required to have completed the following undergraduate courses: two years of chemistry; mathematics through calculus; one year of physics; and at least one year of biology. Experience in a research laboratory during or following baccalaureate study is highly desirable. Applicants must also meet the general admission requirements of the Graduate School.

Normally, all graduate students admitted to the Department of Biochemistry are provided with financial assistance.

Research facilities for the department are housed in the Biochemistry-Genetics Building, which provides approximately 52,000 square feet of excellent research space, conference rooms, and a departmental library. In the immediate vicinity are the Departments of Immunology, Genetics, Microbiology, Molecular Biotechnology, and Pharmacology, as well as programs in biomolecular structure, molecular medicine, and neurobiology, with whom the department has common research interests. The laboratories are equipped with modern research equipment and are supported by external, centralized research facilities, which include a modern computer center, the Marine Biology Laboratory at Friday Harbor, and the Health Sciences Library. An emphasis on biomedical research is facilitated by the location of the department within the School of Medicine.

Correspondence and Information

Graduate Program Coordinator
 Department of Biochemistry, Box 357350

Faculty

Chair

Kenneth A. Walsh

Professors

Adman, Elinor T. * 1967, (Adjunct Research); MA, 1964, PhD, 1967, Brandeis University; macromolecular crystallography, metalloproteins.

Bornstein, Paul * 1967; MD, 1958, New York University; extracellular matrix.

Byers, Breck E. * 1970, (Adjunct); PhD, 1967, Harvard University; cell biology: mitosis and meiosis, mechanisms of nuclear division and crossing-over in yeast.

Chung, Dominic W. 1977, (Research); PhD, 1976, University of California (Los Angeles); factor XI deficiency, structure and function of fibrinogen.

Dale-Crunk, Beverly A. * 1972, (Adjunct); PhD, 1968, University of Michigan; keratin biochemistry.

Davie, Earl Warren * 1962; PhD, 1954, University of Washington; protein synthesis, mechanism of blood clotting, cloning of plasma proteins.

Eisenman, Robert M. * 1982, (Affiliate); PhD, 1971, University of Chicago; viral oncology, oncogenes, retrovirus multiplication.

Eyre, David R. * 1985, (Adjunct); PhD, 1969, University of Leeds (UK); connective tissue biology, collagen chemistry, bone and cartilage metabolism.

Fischer, Edmond H. * 1953, (Emeritus); PhD, 1947, University of Geneva (Switzerland); regulation by phosphorylation.

Floss, Heinz G. * 1987, (Adjunct); PhD, 1961, Technical University of Munich (Germany); bioorganic and natural products chemistry.

Fujikawa, Kazuo 1970, (Research); PhD, 1965, Kyoto University (Japan); studies of blood coagulation and anionic phospholipids at thrombotic sites.

Gelb, Michael H. * 1985, (Adjunct); PhD, 1982, Yale University; mechanistic enzymology, bioorganic and medicinal chemistry.

Glomset, John A. * 1960; MD, 1960, University of Uppsala (Sweden); membrane structure and function.

Gordon, Milton * 1959; PhD, 1953, University of Illinois; molecular basis of plant tumors, control of gene expression in plants.

Hauschka, Stephen D. * 1972; PhD, 1966, Johns Hopkins University; muscle differentiation.

Hol, Wilhelmus G. J. * 1992; PhD, 1971, University of Groningen (Netherlands); protein crystallography, drug design, vaccine development, and protein engineering.

Hurley, James Bryant * 1985; PhD, 1979, University of Illinois; molecular basis of vision.

Jansen, Lyle H. * 1949, (Emeritus); PhD, 1943, University of Washington; molecular structure, x-ray diffraction.

Kaushansky, Kenneth 1986, (Adjunct); MD, 1979, University of California (Los Angeles); hematology.

Krebs, Edwin G. * 1977, (Emeritus); MD, 1943, Washington University; intracellular signaling mechanisms involving protein phosphorylation.

Loeb, Lawrence A. * 1978; MD, 1961, New York University; PhD, 1967, University of California (Berkeley); DNA replication, cancer and AIDS.

Morris, David R. * 1966; PhD, 1964, University of Illinois; regulatory genes.

Palmiter, Richard D. * 1982; PhD, 1968, Stanford University; regulation of gene expression in transgenic mice.

Parson, William W. * 1971; PhD, 1965, Case Western Reserve University; bioenergetics, with particular emphasis on photosynthesis, picosecond spectroscopy.

Perlmutter, Roger M. * 1984; MD, 1979, PhD, 1979, Washington University; molecular immunology and signal transduction in hematopoietic cells.

Petra, Philip H. * 1966; PhD, 1966, Tulane University; reproductive biochemistry.

Reid, Brian R. * 1980; PhD, 1965, University of California (Berkeley); biophysical chemistry.

Ross, Russell * 1962, (Adjunct); DDS, 1955, Columbia University; PhD, 1962, University of Washington; atherosclerosis, growth factors, inflammation, vascular biology.

Saari, John C. * 1974; PhD, 1970, University of Washington; retinal biochemistry.

Sandell, Linda J. * 1987, (Adjunct); PhD, 1980, Northwestern University; biochemistry and molecular biology of connective tissue, extracellular matrix molecules.

Shapiro, Bennett M. * 1970, (Affiliate); MD, 1964, Jefferson Medical College; molecular basis of reproduction.

Teller, David C. * 1965; PhD, 1964, University of California (Berkeley); physical chemistry of macromolecules, association reactions of proteins.

Walsh, Kenneth A. * 1958; PhD, 1959, University of Toronto (Canada); structure and functions of proteins; phosphatases, mass spectrometry.

Young, Elton * 1969; PhD, 1967, California Institute of Technology; regulation of gene activity in the yeast *Saccharomyces cerevisiae*.

Associate Professors

Chou, Patrick Shan-Ho 1986, (Research); PhD, 1984, University of Washington; NMR studies of human centomere (GCA)₂ motif.

Cooper, Jonathan A. * 1987, (Affiliate); PhD, 1976, University of Warwick (UK); regulation of cellular metabolism and proliferation by protein phosphorylation.

Davis, Trisha Neil * 1987; PhD, 1983, Yale University; the function of calcium-binding proteins in cell growth.

Kirmelman, David * 1989; PhD, 1985, Harvard University; molecular biology of early development in the frog, *Xenopus laevis*.

Klevit, Rachel E. * 1983; DPhil, 1981, Oxford University (UK); molecular recognition, protein NMR.

Muller, Eric D. * 1988, (Research); PhD, 1981, Yale University; the regulation of metabolism by the protein thioredoxin.

Quaife, Carol J. 1989, (Research); PhD, 1984, University of Washington; metallothioneins.

Stenkamp, Ronald E. * 1978, (Adjunct); PhD, 1975, University of Washington; crystallography, metalloproteins, protein engineering, blood clotting proteins.

Assistant Professors

Baker, David * 1993; PhD, 1989, University of California (Berkeley); protein folding.

Dizhoor, Alexander M. 1991, (Research); PhD, 1985, Moscow State University (USSR); Ca-dependent proteins, regulation of photoreceptor Ca-dependent guanylate cyclase.

Hahn, Steven M. * 1994, (Affiliate); PhD, 1984, Brandeis University; transcription initiation in yeast.

Kay, Mark A. 1993, (Adjunct); PhD, 1985, MD, 1987, Case Western Reserve University; medical genetics.

Nagarajan, Venkatraman 1987, (Research); PhD, 1985, University of Notre Dame; electron-transfer aspects of photosynthesis.

Roberts, James Michael * 1989, (Affiliate); MD, 1984, PhD, 1984, Columbia University; how cyclin-kinase complexes regulate events necessary for chromosomal DNA replication.

Roth, Mark * 1994, (Affiliate); PhD, 1984, University of Colorado (Boulder); nuclear proteins involved in the regulation of gene expression.

Ruohola-Baker, Hannele * 1993; PhD, 1989, Helsinki University (Finland); oogenesis, developmental genetics.

Stoddard, Barry L. 1994, (Affiliate); PhD, 1990, Massachusetts Institute of Technology; structure and function of enzyme catalysts, bacterial signal transduction.

Yarfitz, Stuart 1992, (Research); PhD, 1986, State University of New York (Buffalo); signal transduction in *Drosophila* photoreceptors.

Yee, Vivien C. 1995, (Research); PhD, 1995, University of British Columbia (Canada); molecular structure of Factor XIII, a protein involved in blood coagulation.

Zhang, Kam * 1995, (Affiliate); PhD, 1990, Massachusetts Institute of Technology; structure and function of enzyme catalysts, bacterial signal transduction.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Course numbers with a P suffix are not graduate courses and are restricted to medical student enrollment only.

BIOC 405, 406 Introduction to Biochemistry (3,3) NW Hurley, Petra, Sandell, Teller Basic principles of biochemistry, emphasizing broad understanding of chemical events in living systems in terms of metabolism and structure-function relationships of biologically important molecules. Does not fulfill advanced biochemistry prerequisites (see 440, 441, 442). Prerequisites: general biology and organic chemistry or permission of instructor for 405; 405 or permission of instructor for 406. Offered: AW.

BIOC 426 Basic Techniques in Biochemistry (3) NW Davie Introduction to basic biochemistry experiments. Acquaints students with basic biochemical laboratory techniques and serves as a preparation for advanced biochemistry laboratory courses. Prerequisites: 405 and 406 or 440 and 441 or equivalent. Offered: ASP.

BIOC 440, 441, 442 Biochemistry (4, 4, 4) NW Bornstein, Gordon, Kimelman, Palmiter, Parson,

Stenkamp, Young Interdisciplinary course in general biochemistry and molecular biology for undergraduate students in molecular and cellular biology and graduate students in other science departments. One-hour quiz per week required. Prerequisite: BIOL 201 and three quarters organic chemistry. Offered: AWSp.

BIOC 498 Undergraduate Thesis (*) For senior medical students. Prerequisite: permission of instructor. Offered: AWSpS.

BIOC 499 Undergraduate Research (*) Investigative work on enzymes, proteins, lipids, nucleic acids, protein biosynthesis, intermediary metabolism, physical biochemistry, and related fields. Credit/no credit only. Prerequisite: permission of instructor. Offered: AWSpS.

BIOC 515-519 (For description, see listing for "Current Literature Conferences" at the end of this section.)

BIOC 520 Seminar (1) Seminar dealing with special topics in the field of biochemistry. Prerequisite: permission of instructor. Offered: AWSpS.

BIOC 525-529 (For description, see listing for "Current Literature Conferences" at the end of this section.)

BIOC 530 Advanced Biochemistry (3) Baker, Gelb, Hol, Klevit, Stenkamp, Stoddard Graduate-level discussion of the structure, function, and chemistry of proteins, control of enzymatic reactions. Prerequisites: a comprehensive course in biochemistry and permission. Offered: A.

BIOC 533 Topics in Biochemistry (1-3) Palmiter Provides in-depth examination of current topics in biochemistry, molecular biology, and structural biology. Designed to help participants in basic science departments become acquainted with latest ideas on topics being covered. Emphasis on analysis of key concepts in the field with reference to classical papers and recent literature. Prerequisite: permission of instructor. Offered: AWSp.

BIOC 534 Topics in Molecular Biophysics (1-2) Parson Emphasis on methods used to study macromolecular structure and dynamics, including x-ray crystallography, NMR, optical spectroscopy, computer modeling, protein folding and ligand binding. Two topics covered each quarter; students may register for one or both. Prerequisite: permission of instructor. Offered: AWSp.

BIOC 535-539 (For description, see listing for "Current Literature Conferences" at the end of this section.)

BIOC 540, 541, 542 Literature Review (2, 2, 2) Emphasizes critical evaluation of original articles in the literature. For first-year graduate students in biochemistry and students of other science departments, with permission. Entry code required. Offered: AWSp.

BIOC 548-548 (For description, see listing for "Current Literature Conferences" at the end of this section.)

BIOC 555-559 (For description, see listing for "Current Research Conferences" at the end of this section.)

BIOC 565-569 (For description, see listing for "Current Research Conferences" at the end of this section.)

BIOC 575-579 (For description, see listing for "Current Research Conferences" at the end of this section.)

BIOC 581 Introduction to Biochemical Research (3, max. 6) Student works with one of the research groups within the department for one quarter and then rotates to other laboratories for second and third quarters. Credit/no credit only. Prerequisite: graduate standing in biochemistry or permission of instructor. Entry code required. Offered: AWSpS.

BIOC 588-588 (For description, see listing for "Current Research Conferences" at the end of this section.)

BIOC 600 Independent Study or Research (*) Offered: AWSpS.

BIOC 700 Master's Thesis (*) Offered: AWSpS.

BIOC 800 Doctoral Dissertation (*) Offered: AWSpS.

Current Literature Conferences

BIOC 515-519, 525-529, 535-539, 548-548 Current Literature Conference in Biochemistry Weekly literature reviews of topics pertinent to ongoing research in biochemistry. Students may register for more than one conference each quarter. Credit/no credit only. Prerequisite: permission of instructor. (Only 25 credits may be counted toward degree.)

BIOC 515 Matrix Macromolecules in Morphogenesis and Development (1, max. 30) Bornstein Offered: AWSp.

BIOC 516 Molecular Mechanisms of Blood Clotting (1, max. 30) Davie Offered: AWSp.

BIOC 517 Protein Structure (1, max. 30) Baker Prerequisite: permission of instructor. Credit/no credit only. Offered: AWSpS.

BIOC 518 Signaling in Development (1) Ruohola-Baker Prerequisite: permission of instructor. Credit/no credit only. Offered: AWSpS.

BIOC 525 Phytoremediation (1, max. 4) Gordon Literature survey of phytoremediation topics. Discussion of latest techniques for the use of plants to concentrate heavy metals in the soil and of plants and plant-bacteria combinations to detoxify various organic contaminants. Credit/no credit only. Offered: AWSpS.

BIOC 526 Control of Growth and Differentiation During Development (1, max. 30) Hauschka Offered: AWSpS.

BIOC 528 Signal Transduction (1, max. 30) Hurley Offered: AWSp.

BIOC 529 Molecular Biology of Early Development (1, max. 30) Kimelman Offered: AWSpS.

BIOC 535 Macromolecular Structure (1, max. 30) Klevit Offered: AWSp.

BIOC 536 Control of Cell Growth (1, max. 30) Morris Offered: AWSp.

BIOC 537 Regulation of Gene Expression (1, max. 30) Palmiter Offered: AWSpS.

BIOC 539 Immunobiology (1, max. 30) Perlmutter Offered: AWSpS.

Current Research Conferences

BIOC 555-559, 565-569, 575-579, 588-588 Current Research Conferences in Biochemistry Weekly group conferences concerning ongoing graduate student and postdoctoral research in biochemistry. Students may register for more than one conference each quarter. Credit/no credit only. Prerequisite: permission of instructor. (Only 25 credits may be counted toward degree.)

BIOC 555 Cell and Molecular Biology of Connective Tissue Proteins (1, max. 30) Bornstein Offered: AWSpS.

BIOC 556 Enzymatic and Genetic Aspects of Blood Clotting (1, max. 30) Davie Offered: AWSp.

BIOC 557 Growth Regulation by Calcium Binding Proteins (1, max. 30) Davis Offered: AWSpS.

BIOC 558 Regulation of Cellular Events by Protein Phosphorylation (1, max. 30) Fischer, Krebs Offered: AWSpS.

BIOC 559 Membrane Biochemistry and Cell Growth (1, max. 30) Glomset Offered: AWSpS.

BIOC 560 Protein Folding (1) *Baker* Prerequisite: permission of instructor. Credit/no credit only. Offered: AWSpS.

BIOC 561 Origin of Polarity (1) *Ruohola-Baker* Prerequisite: permission of instructor. Credit/no credit only. Offered: AWSpS.

BIOC 565 Plant Molecular Genetics (1, max. 30) *Gordon* Offered: AWSpS.

BIOC 566 Growth and Differentiation of Skeletal and Cardiac Muscle (1, max. 30) *Hauschka* Offered: AWSpS.

BIOC 568 Molecular and Genetic Aspects of G Protein Signal Transduction (1, max. 30) *Hurley* Offered: AWSpS.

BIOC 569 Inductive Events in Early Development (1, max. 30) *Kimelman* Offered: AWSpS.

BIOC 575 NMR Analysis of Proteins and Nucleic Acids (1, max. 30) *Kievit* Offered: AWSpS.

BIOC 576 Sequential Analysis of Growth Regulation (1, max. 30) *Morris* Offered: AWSpS.

BIOC 577 Gene Regulation in Transgenic Mice (1, max. 30) *Palmiter* Offered: AWSpS.

BIOC 578 Electron Transport in Photosynthesis (1, max. 30) *Parson* Offered: AWSpS.

BIOC 579 Molecular Biology of the Immune System (1, max. 30) *Perlmutter* Credit/no credit. Offered: jointly with IMMUN 559; AWSpS.

BIOC 587 Structural Domains, Evolution, and Regulation of Proteins (1, max. 30) *Neurath, Walsh* Offered: AWSpS.

BIOC 588 Molecular Biology of Yeast Gene Regulation (1, max. 30) *Young* Offered: AWSpS.

lively atmosphere in the department that provides a stimulating environment for the training of scientists with a variety of backgrounds.

The department's graduate program is directed toward the education of doctoral students who anticipate careers that will involve teaching and/or research in the biomedical sciences. Graduates from the program are expected to have a broad knowledge of biological structure at all levels, from the molecular to the human anatomical, with major emphasis on the cellular level.

Graduate students select research and teaching pathways in their program. The research pathways are designed to provide training for a student in one or two of the following areas: cell and developmental biology, neurobiology, reproductive biology, quantitative biology, cellular immunology, molecular biology, and macromolecular structure. The purpose of the teaching pathways is to prepare the student to teach in one of the anatomical subdisciplines: human anatomy, neuroanatomy/neurobiology, histology, embryology/developmental biology, cell biology, and macromolecular structure.

Special Requirements

Applicants should have completed an undergraduate major in any appropriate field, such as anthropology, biochemistry, biology, chemistry, physics, psychology, or zoology.

Financial Aid

The department offers financial support through teaching assistantships and training grant positions and from research funds.

Correspondence and Information

Graduate Program Coordinator
Department of Biological Structure, Box 357420
email: gradprog@biostr.washington.edu

Faculty

Chair

Anita E. Hendrickson

Professors

Adman, Elinor T. * 1967, (Research); MA, 1964, PhD, 1967, Brandeis University; macromolecular crystallography, metalloproteins.

Baskin, Denis G. * 1979, (Research); PhD, 1969, University of California (Berkeley); histology, cytochemistry, neuroendocrinology.

Blandau, Richard J. 1949, (Emeritus); PhD, 1939, Brown University; MD, 1948, University of Rochester; endocrinology, embryology, phase microscopy, reproductive physiology.

Bolender, Robert P. * 1975; PhD, 1970, Harvard University; information systems for structural biology and biological stereology.

Byers, Margaret R. * 1972, (Research); PhD, 1969, Harvard University; somatosensory receptor structure, cytochemistry, and pathologic reactions; neuroimmune interactions.

Clark, John I. 1982; PhD, 1974, University of Washington; structural and developmental basis of lens-cell transparency and cataract formation.

Gehrig, John D. * 1954, (Emeritus); DDS, 1946, MSD, 1951, University of Minnesota; oral and maxillofacial surgery, biological structure.

Hendrickson, Anita E. * 1969; PhD, 1964, University of Washington; neuroanatomy, morphology and development of primate retina.

Herring, Susan W. * 1990, (Adjunct); PhD, 1971, University of Chicago; vertebrate functional morphology, relations between muscular function and skull growth.

Hol, Wilhelmus G. J. * 1992; PhD, 1971, University of Groningen (Netherlands); protein crystallography, drug design, vaccine development, and protein engineering.

Jensen, Lyle H. * 1949, (Emeritus); PhD, 1943, University of Washington; molecular structure, x-ray diffraction.

Koehler, James K. * 1963; PhD, 1961, University of California (Berkeley); electron microscope, cryobiology, reproductive biology.

Myall, Robert W. * 1977, (Adjunct); BDentS, 1964, University of London (UK); MD, 1975, University of British Columbia (Canada); oral and maxillofacial surgery and biological structure.

Odland, George F. 1955, (Emeritus); MD, 1946, Harvard University; dermatology.

Patton, Dorothy L. 1981, (Adjunct); PhD, 1981, University of Washington; infectious disease.

Reh, Thomas A. * 1989; PhD, 1981, University of Wisconsin; regeneration and development of central nervous system.

Rosse, Cornelius * 1967; PhD, 1974, DSc, 1983, University of Bristol (UK); knowledge representation in anatomy.

Sage, E. Helene * 1980; PhD, 1977, University of Utah; molecular and cell biology.

Verdugo, Pedro * 1974, (Adjunct); MD, 1965, State University of Chile; microrheology, biomechanics, polymer gel physics, laser spectroscopy, cell biology.

Westrum, Lesnick E. * 1966; MD, 1963, University of Washington; PhD, 1966, University College, London (UK); neuroanatomy, synaptology, plasticity, olfactory and trigeminal systems, dental pathways.

Associate Professors

Anderson, Leigh C. * 1988, (Adjunct); DDS, 1977, PhD, 1979, University of Minnesota; salivary gland physiology, neural and hormonal regulation of secretion.

Brinkley, James F. III * 1988, (Research); MD, 1974, University of Washington; PhD, 1984, Stanford University; computer applications in medicine and biology.

Dacey, Dennis M. * 1986, (Research); PhD, 1983, University of Chicago; the neural basis of vision and the organization of primate retina.

Farr, Andrew G. * 1982; PhD, 1975, University of Chicago; cell interactions governing lymphocyte production and function.

Gaddum-Rosse, Penelope * 1969; PhD, 1965, University of Liverpool (UK); reproductive biology.

Graney, Daniel O. * 1966; PhD, 1965, University of California (San Francisco); gross anatomy, clinical anatomy, computers in teaching.

Harris, Roger M. * 1982; PhD, 1975, University of Washington; neuro-anatomical recovery from spinal cord injury.

Kalet, Ira J. * 1980, (Adjunct); PhD, 1968, Princeton University; computer simulation of radiation therapy, artificial intelligence, computer graphics.

Landau, Barbara R. 1962, (Emeritus); MS, 1949, PhD, 1956, University of Wisconsin.

Lee, Minako Y. * 1977, (Research); MD, 1963, Tokyo Women's Medical College (Japan); hematopoiesis and osteoclast development.

Merritt, Ethan A. 1989, (Research); PhD, 1980, University of Wisconsin.

Nameroff, Mark A. * 1970; MD, 1965, PhD, 1966, University of Pennsylvania; cell differentiation.

Press, Oliver W. * 1982, (Adjunct); PhD, 1977, MD, 1979, University of Washington; treatment of hematologic malignancies with monoclonal antibody immunoconjugates.

Bioengineering

309 Harris Hydraulics Laboratory

The Center for Bioengineering provides a multidisciplinary program of collaborative research and training designed to accelerate the application of new engineering technologies to clinical practice and research. Major areas of current bioengineering research include bioinstrumentation, biomaterials, biomechanics, controlled drug-release systems, imaging, microsensors, bioelectromagnetics, molecular bioengineering, microcirculation, cellular bioengineering, muscle, and simulation of biosystems. There are options for study leading to master's and doctoral degrees with different levels of specialization. Detailed information on Bioengineering, its faculty and courses appears in the Interschool or Intercollege Programs section of this catalog.

Biological Structure

Ronald Stenkamp, Graduate Program Coordinator
G514 Health Sciences

The Department of Biological Structure offers graduate programs of study leading to the Master of Science and Doctor of Philosophy degrees. The department promotes an understanding of biological processes through the study and analysis of structure-function relationships. The research problems that interest members of the faculty are diverse, including cellular differentiation and development explored in a variety of biological systems, neuroscience, molecular biophysics, biomolecular structure, and quantitative biology with an emphasis on computer graphic representations of biological structures. This diversity creates a

Prothero, John W. * 1965; PhD, 1960, Western Ontario University (Canada); model building, morphogenesis, cell kinetics, scaling.

Reuveni, Zipora * 1982; (Research); PhD, 1979, University of Windsor (Canada); myogenesis during growth development and regeneration of skeletal muscle.

Sherk, Helen * 1982; PhD, 1978, Massachusetts Institute of Technology; neural mechanisms underlying vision, especially visual guidance during locomotion.

Skahen, Julia G. 1941, (Emeritus); MS, 1928, University of Washington; PhD, 1941, University of Chicago.

Stenkamp, Ronald E. * 1978; PhD, 1975, University of Washington; crystallography, metalloproteins, protein engineering, blood clotting proteins.

Sundsten, John Wallin 1962; PhD, 1961, University of California (Los Angeles); neuroanatomy.

Assistant Professors

Bassuk, James A. 1992, (Research); PhD, 1983, Iowa State University.

Broderon, Stevan H. * 1967; PhD, 1967, State University of New York (Buffalo); computer graphics.

Raible, David W. 1995; PhD, 1989, University of Pennsylvania; zebrafish neural development.

Roelink, Henk 1996; MSc, 1985, University of Groningen (Netherlands); PhD, 1991, University of Amsterdam (Netherlands); role of signaling molecules in mediating neural tissue differentiation during vertebrate development.

Stewart, Lansing J. 1996, (Research); PhD, 1992, Cornell University.

Verlind, Christophe L. M. 1992, (Research); PhD, 1988, University of Leuven (Belgium).

Lecturers

Mulligan, Kathleen A. 1987; PhD, 1985, University of New South Wales (Australia); neurobiology, gross anatomy, teaching innovations, technical communication.

Peterman, Annie K. 1989; PhD, 1987, University of Washington.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Course numbers with a P suffix are not graduate courses and are restricted to medical or dental student enrollment only.

B STR 301 General Anatomy (4) NW Bolender, Broderon, Clark, Farr, Graney, Harris, Sherk Survey of systemic human anatomy, including human skeletal system, muscular system, respiratory system, circulatory system, nervous system, digestive system, endocrine system, urinary system, and reproductive system. For second, third, and fourth year undergraduates. Offered: Sp.

CONJ 340, 341, 342 Human Anatomy and Physiology (4, 4, 4) Linder, Peterman See Conjoint Courses. Offered: A, W, Sp.

B STR 431 Introduction to Neuroanatomy (4) NW Gehrig, Harris, Prothero, Sundsten, Westrum General survey of the structure of the central nervous system, including an analysis of sensory and motor systems and higher integrative functions and clinical correlation. Restricted to OT, PT, and dental students. Prerequisite: 301 or permission of instructor. Offered: W.

B STR 498 Undergraduate Thesis (*) Individual research projects under the supervision of an instructor. For senior medical students. Entry code required.

Prerequisite: permission of instructor. Offered: A, W, Sp.

B STR 499 Undergraduate Research (*) Individual research projects in cellular and developmental biology, experimental immunology, reproductive biology, neurobiology, molecular structure, morphometrics, computer modeling, and related fields under the supervision of an instructor. Entry code required. Prerequisite: permission of instructor. Offered: A, W, Sp.

B STR 501 Gross Anatomy (1-10, max. 10) Rosse Lecture and laboratory dissection course in regional anatomy: thorax, abdomen, pelvis, perineum. Prerequisite: permission of instructor. Offered: A.

B STR 502 Gross Anatomy (1-5) Graney Lecture and laboratory dissection course in regional anatomy: upper and lower extremities. Prerequisite: permission of instructor. Offered: W.

B STR 503 Gross Anatomy (1-5) Graney Lecture and laboratory dissection course in regional human anatomy: head and neck. Prerequisite: permission of instructor. Offered: Sp.

B STR 505 Histology in Biomedical Research (3) Baskin Selected topics in histology, with emphasis on analysis of research literature, methods, and laboratory exposure. Prerequisite: permission of instructor. Offered: even years; W.

CONJ 508 EM Methods and Interpretation (3-5) Wight See Conjoint Courses.

B STR 510 Seminar in Anatomy (1) Graney, Rosse Scientific and historical basis of selected studies in biological structure, anatomy, and human development. Original literature used as basis for textbook descriptions is reviewed. Prerequisite: permission of instructor. Offered: A, W, Sp.

B STR 512 Human Microanatomy (4) Nameroff Lectures and laboratory treating the specialized tissues and organs of the body from the microscopic and ultramicroscopic points of view. Prerequisite: permission of instructor. Offered: A.

B STR 514 Methods in Quantitative Morphology (3) Bolender Lecture/laboratory course covering major techniques in areas of organ, tissue, cellular, and molecular biology. Emphasis on understanding the use of modern experimental methods for detecting and interpreting structural changes in biology. Prerequisite: familiarity with microcomputers and permission of instructor. Offered: even years; Sp.

B STR 515 Biological X-ray Structure Analysis (3) Stenkamp Theory of x-ray diffraction, with emphasis on applications to biological systems. Prerequisite: permission of instructor. Offered: W.

B STR 517 Embryology/Developmental Biology Seminar (1) Nameroff Embryology of a region or organ. Topics vary. Emphasis on original literature and developmental principles. Prerequisite: permission of instructor. Offered: A, W, Sp.

B STR 519 Current Problems in Macromolecular Structure (2, max. 10) Stenkamp A discussion of macromolecular structures related to specific areas of biological research. Emphasis on discussion of relevant research papers and use of computer graphics to visualize the molecular structures. Offered: A, W, Sp.

CONJ 520 Anatomy and Autopsy (1/2) Fligner See Conjoint Courses. Offered: Sp.

UCONJ 524 Developmental Neurobiology (3) Reh See University Conjoint Courses. Offered: W.

B STR 520 Structure Based Design of Drugs and Vaccines (3) Hol Lecture and discussion on research papers illustrating protein structure based design of new drugs and vaccines. Review of methods of structure-based drug design and problem of drug

resistance. Discussion on importance of adjuvants, protein engineering methods, and immune evasion methods in vaccine design. Offered: W.

B STR 521 Advanced Biomacromolecular Crystallography (3) Hol, Merritt, Stenkamp Aspects of protein crystallography ranging from crystal growth, phase determination methods, density averaging to refinement, fiber diffraction of DNA and proteins. Offered: odd years; Sp.

B STR 525 Brain Dissection (2) Sundsten Detailed consideration of the macroscopic anatomy of the human brain (individual study). Entry code required. Prerequisite: permission of instructor. Offered: Sp.

B STR 530P Gross Anatomy and Embryology for Dental Students (7) Broderon, Clark, Rosse Normal anatomy of the thorax, abdomen, pelvis, and perineum are discussed and dissected employing cadavers. The development of the organ systems is presented and related to definitive adult structure. Developmental anomalies and diagnostic anatomy are also discussed. Prerequisite: admission to School of Dentistry. Offered: A.

B STR 535 Dental Musculoskeletal System (1) Broderon The gross anatomy, embryology and clinical topics relating to the musculoskeletal system are presented in lecture and reinforced through human dissection. Restricted to first year dental students. Prerequisite: 530. Offered: Sp.

B STR 540 Special Problems in Anatomy (1-6, max. 6) Special projects in anatomy under sponsorship of faculty member. Prerequisite: graduate, medical, or dental student standing and permission of instructor. Offered: A, W, Sp.

B STR 541P Microscopic Anatomy for Dental Students (4) Koehler Lecture and laboratory work in microscopic anatomy. For dental students taking HUBIO 510; others by permission of instructor. Offered: A.

B STR 550P Head and Neck Anatomy for Dental Students (4) Broderon, Clark, Graney Normal anatomy of the head is discussed and dissected employing human cadavers. The fundamentals of diagnostic anatomy are also discussed. Restricted to first-year dental students. Prerequisites: 530p. Offered: Sp.

B STR 555 Laboratory Rotation in Biological Structure (*, max. 5) Introduction to experimental design, research methods, and scientific thought in laboratories of faculty members. Provides hands-on experience, an entrance into the literature of the field, and opportunities for discussion with all members of the laboratory. First year dental students only. Prerequisite: permission of instructor. Offered: A, W, Sp.

B STR 556 Topics in Developmental and Systemic Cell Biology (1-3) Recent advances in molecular and developmental aspects of cell biology. Emphasis on specific organ systems. Differentiation of lymphocytes, germ cells, muscle, epidermis; cell biology of lens, vessel wall, visual cortex; computer modeling; cell-cell and cell-matrix interactions. Prerequisites: undergraduate biochemistry and/or molecular biology, general cell biology; or permission of instructor. Offered: A, W, Sp.

B STR 557 Biomolecular Structure Seminar (1) Hol Literature review of key research in Biomolecular Structure in the form of short presentations by participants followed by discussion. Critical evaluation of methods and results regarding properties and protein structure determination. Credit/no credit only. Prerequisite: graduate standing in biological structure or biochemistry and permission of instructor. Offered: A, W, Sp.

B STR 559 Developing Research Proposals (2) Developing research proposals in cellular, molecular, and developmental biology; neurobiology; morpho-

metrics and computer modeling; experimental immunology and hemopoiesis; reproductive biology; molecular structure. Weekly seminars by faculty and written proposals by students to include background and significance of projects specific hypotheses and aims, methodology, analyses of possible outcomes. Prerequisite: permission of instructor. Offered: even years; Sp.

B STR 580P Anatomy Teaching Practicum (*, max. 8) *Graney, Koehler, Rosse, Sherk* Opportunity for medical student (or other professional student) to gain teaching experience in biological structure and human biology courses, including gross anatomy, histology, and neuroanatomy. May include lecture, laboratory, conference, depending on student interest, experience. Credit based on course credit in which student is assisting. Prerequisite: permission of course chairperson. Offered: AWSp.

B STR 581P Anatomy: Intraoral Dissection of Maxilla and Mandible (1) *Baeb, Gehrig* Lecture and dissection course in intraoral anatomy (maxilla and mandible only) from a periodontal surgical approach. Prerequisite: graduate standing in periodontics. Offered: Sp.

B STR 584 Seminar in Neurogenesis (1) *Reh* Discussion of current research on process by which neurons are generated in the nervous system. Offered: AWSp.

CONJ 585 Surgical Anatomy (1-3, max. 12) *Graney* See Conjoint Courses. Offered: AWSp.

B STR 591 X-ray and NMR Analysis of Macromolecular Structure (1, max. 9) *Adman, Stenkamp* Weekly discussion of current topics in research on molecular structure, usually emphasizing techniques of x-ray crystallography. Credit/no credit only. Prerequisite: permission of instructor. Offered: AWSp.

B STR 592 Current Methods in Molecular and Cellular Biology (3) Lecture/laboratory demonstration course covering 6-7 current techniques in the areas of molecular and cellular biology. Emphasis on the type of scientific questions and problems that can be addressed by various methods that are in current use. Offered: Sp.

B STR 594 Seminar in Myogenesis (1, max. 5) *Nameroff* Discussion of recent work on the differentiation of skeletal muscle and related cell types. Emphasis on the cell-biological aspects of differentiation both in vivo and in vitro. Credit/no credit only. Prerequisite: permission of instructor. Offered: AWSp.

B STR 595 Skin Biology Seminar (1, max. 5) *Smith* Presentation, discussion of ongoing multidisciplinary research in basic and clinical problems of adult and fetal skin biology. Genetic diseases of epidermis and dermis, percutaneous absorption in adult and fetal skin, wound healing, cutaneous blood flow, development and prenatal diagnosis of inherited disorders, pigment cell biology. Credit/no credit only. Prerequisite: permission of instructor. Offered: AWSp.

B STR 597 Topics in Neurobiology (1, max. 5) *Harris* Presentations by participants of topics in neuroanatomy, neurophysiology, neurochemistry, and other areas relating to the nervous system. Problems of current research interest. Credit/no credit only. Prerequisite: permission of instructor. Offered: AWSp.

B STR 598 Reading in Biological Structure (2) Critical evaluation of research in biological structure, including current problems, methods and future directions by reading and discussing research and review papers. Credit/no credit only. Prerequisite: permission of instructor. Offered: AWSp.

B STR 600 Independent Study or Research (*) Offered: AWSp.

B STR 700 Master's Thesis (*) Offered: AWSp.

B STR 800 Doctoral Dissertation (*) Offered: AWSp.

Comparative Medicine

T142 Health Sciences

The Department of Comparative Medicine provides education and research opportunities in the use of animals in biomedical research, testing, and education. In addition, training is provided for veterinarians in the diagnosis, treatment, and prevention of the diseases of laboratory animals. Current educational programs include scheduled courses in the principles and techniques of animal experimentation (C MED 407) for biomedical graduate students; zoonotic diseases; and training in laboratory animal medicine for veterinary medical students and veterinarians combined with a Master of Science degree program in comparative medicine. Areas of current research interests include immunotoxicology; and development and characterization of transgenic, somatic cell gene transfer and spontaneous animal models of human disease conditions.

Postdoctoral Program

Postdoctoral training in the areas of laboratory animal medicine and comparative pathology is offered to persons with a D.V.M. or equivalent degree. Training consists of a combination of course work, clinical residency rotations, and research over a three year period leading to a Master of Science degree in comparative medicine. The program also prepares participants for specialty certification by the American College of Laboratory Animal Medicine. Stipend support is normally provided.

Master of Science

The Master of Science degree in comparative medicine provides advanced training in comparative medicine to veterinarians. Admission to the degree program requires acceptance into the department's Postdoctoral Training Program. The degree option involves additional elective courses, the completion of a more involved research project, and a thesis.

Predocotoral Program

This program is designed to acquaint veterinary medical students with laboratory animal medicine as a veterinary specialty. Specific areas covered include control/treatment of the principal diseases of common laboratory animals and their role in biomedical research. Blocks of four to eight weeks are available for fourth-year students year-round. Stipend support is normally provided.

Correspondence and Information

Academic Program Coordinator
T142 Health Sciences, Box 357190

Faculty

Chair

Melvin B. Dennis

Professors

Dennis, Melvin B. * 1971; DVM, 1961, Washington State University; comparative medicine, including animal models and experimental surgery.

Di Giacomo, Ronald F. * 1974; DVM, 1965, University of Pennsylvania; MPH, 1974, University of Washington; epidemiology and zoonoses.

Liggitt, H. Denny * 1989; DVM, 1972, PhD, 1979, Colorado State University; using in vivo models to evaluate novel approaches for gene delivery, transgenic models.

Rausch, Robert L. * 1978, (Emeritus); DVM, 1945, Ohio State University; PhD, 1949, University of Wisconsin; parasitology, helminthic zoonoses.

Van Hoosier, Gerald * 1975; DVM, 1957, Texas A&M University; laboratory animal medicine with emphasis on effects of intercurrent infection on mouse phenotypes.

Wolf, Norman S. * 1968, (Adjunct); DVM, 1953, Kansas State University; PhD, 1960, Northwestern University; hematopoietic stem cell dynamics and transplantation, aging at the cellular level.

Associate Professors

Grossmann, Angelika * 1985, (Affiliate); DVM, 1978, PhD, 1982, Freie University of Berlin (Germany); immunosenescence in humans and mice; immunotoxicology; transmembrane signaling in T-lymphocytes.

Ladiges, Warren C. * 1982; DVM, 1971, Washington State University; molecular immunology of autoimmune disease, transgenic mouse models of aging.

Price, Lillian M. * 1984; DVM, 1972, PhD, 1983, University of Pennsylvania; t-cell development in the thymus, immunotoxicology, thymus development, retinoic acid embryopathy.

Thouless, Margaret E. * 1980, (Adjunct); PhD, 1974, University of Birmingham (UK); retroviruses, herpes viruses, enteric viruses, immunodiagnosis, virus variability.

Assistant Professor

Pekow, Cynthia A. 1986, (Clinical); DVM, 1984, University of Illinois; comparative medicine, including animal models and antibody production.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

C MED 407 Principles of Animal Experimentation (3) *Dennis, Van Hoosier* Focus on biology and care of experimental animals, animal models of human disease, ethical use of animals in biomedical research and teaching; techniques of aseptic surgery. Includes lectures and animal-use laboratories. For graduate and advanced undergraduate students. Prerequisite: permission of instructor. Offered: A.

C MED 512 Introduction to the Anatomical Analysis of Animal Disease (5, max. 10) *Liggitt, Van Hoosier* Use of animals in experimental study of disease; techniques of animal necropsy, characterization, interpretation of gross and microscopic lesions, correlation of lesions with altered physiological processes, differentiation between naturally occurring and experimentally induced lesions. Prerequisites: PATH 444, 445, or equivalent, and permission of instructor. Enrollment limited: two students per quarter. Offered: AWSp.

C MED 514 Comparative Pathology Conference (1, max. 6) *Liggitt, Van Hoosier* Focus on histopathology of naturally occurring and experimentally induced lesions of primates, laboratory and domestic animals, fish, wildlife, and birds. Participants discuss the lesions and the basic pathogenetic mechanisms that underlie them. Prerequisites: PATH 500 or equivalent and permission of instructor. Offered: AWSp.

C MED 516 Current Literature in Laboratory Animal Medicine (1, max. 12) *Dennis, Van Hoosier* Critical evaluation of recent articles on laboratory animal medicine and science. Emphasis on literature dealing with spontaneous diseases of laboratory animals, biology and husbandry, zoonotic diseases, and

animal models of human disease. Experimental design, use of animals in research, and methods of reviewing manuscripts. Prerequisite: permission of instructor. Offered: AWSpS.

C MED 518 Clinical Conference Seminar (1, max. 12) *Ladiges, Van Hoosier* Clinical reports of cases of spontaneous and induced diseases, animal models of human disease, and zoonotic diseases discussed. Disease prevalence and preventive medicine measures. Diagnostic exercises. Prerequisite: permission of instructor. Offered: AWSpS.

C MED 520, 521 Biology of Laboratory Animals (2,2) *Van Hoosier* Fundamentals of the morphological, functional, and applied aspects of anatomy, physiology, pharmacology, biochemistry, and immunology of the commonly used laboratory animal species. Similarities and differences within, and between, species, including man. Husbandry, genetics, behavior, and nutrition. Prerequisite: permission of instructor. Offered: S.

C MED 526 Zoonotic Diseases (3) *DiGiacomo, Rausch* Explores the public health aspects of zoonotic diseases, their epidemiology and current approaches to control. Focuses on the major viral, rickettsial, bacterial, protozoal, helminthic, and fungal diseases transmitted from wild and domesticated animals to humans in North America. Prerequisite: 511, 512, or 520 or permission of instructor. Offered: jointly with EPI 526; S.

C MED 530, 531 Diseases of Laboratory Animals (3,3) *Van Hoosier* Analysis of etiology, pathogenesis, pathology, and disease processes in rodents, lagomorphs, carnivores, and nonhuman primates. Prerequisite: permission of instructor. Offered: S.

C MED 540 Animal Models (1) *Dennis* Naturally occurring and experimentally induced analogs of human diseases in animals with emphasis on diseases in search of animal models, and approaches to identifying new models. Animal models of categorical disease (e.g., cancer, atherosclerosis, gerontology) discussed. Prerequisite: permission of instructor. Offered: S.

C MED 590 Selected Topics in Animal Medicine (2) *Dennis, Van Hoosier* Radiation biology, genetics, anesthesiology and experimental surgery, preventive medicine, and ethical aspects of use of animals in biomedical teaching and research. Specific topics vary from year to year, depending on the expertise of the annual visiting professor. Prerequisite: permission of instructor. Offered: S.

C MED 600 Independent Study or Research (*) Offered: AWSpS.

C MED 601 Internship Rotation—Laboratory Animal Medicine (1) Prerequisite: DVM degree. Offered: AWSpS.

C MED 700 Masters Thesis (*) Offered: AWSpS.

Conjoint Courses

See page 56 for explanation of course numbers, symbols, and abbreviations.

Course numbers with a P suffix are not graduate courses and are restricted to medical student enrollment only.

CONJ 340, 341, 342 Human Anatomy and Physiology (4, 4, 4) *Linder, Peterman* Introductory course integrating physiology with some histology and gross anatomy of the human body. Primarily for pharmacy students, some nursing students and others by permission of course coordinator in Department of Physiology and Biophysics. Prerequisites: CHEM 140, introductory biology and permission of instructor. Offered: A, W, Sp.

CONJ 475 Alcoholism: A Course for Medical Students and Students in the Allied Health Sciences (2) *Kivlahan, Samson* A lecture course for medical students in the allied health sciences in any year that will cover an introduction to the epidemiology, diagnostic strategies, natural history, physiologic effects, and treatment of alcohol-related disorders. Offered: Sp.

CONJ 501, 502, 503 Molecular Basis of Cell Function (3,3,3) *Detwiler* Plasma membrane (501), including membrane structure, ion channels, transmembrane signaling; nucleus (502), including chromatin structure, recombination, RNA processing and gene expression; and cytoplasm (503), including protein synthesis targeting and secretion, organelles, extracellular matrix, higher-order cell functions. Prerequisites: introductory biochemistry or permission of instructors. Physiology/Biophysics responsible. Offered: A, W, S.

CONJ 505P Pain Clinic Preceptorship (1) *Loeser* One morning a week for a total of 30 hours per quarter spent observing patient care in either inpatient or outpatient settings at University of Washington Medical Center; associated readings. Prerequisite: first- or second-year medical student standing. Coordinator: Pain Center.

CONJ 508 EM Methods and Interpretation (3-5) *Wight* Techniques used in biological transmission and scanning electron microscopy. Practical laboratory experience in research environment, tutorial discussions of cell architecture as related to the functional behavior of cells. Student projects required. Prerequisites: a basic cell biology course and graduate or postdoctoral status in pathology or biological structure.

CONJ 515 Interdisciplinary Health and Human Services Delivery in Rural Communities (1) *House, Peter* Provides opportunities for students in health and human services to explore current trends and issues of service delivery in rural communities. Demographics, economics, community structure, culture, and professional/personal issues are addressed. Prerequisite: major standing in a health or human services profession. Offered: W.

CONJ 519 Molecular and Cellular Neurobiology (3) *Bothwell, Carlson* Concepts and techniques of molecular and cell biology as applied to understanding development and function of the nervous system. Recommended: biochemistry course or equivalent. Coordinator: Department of Physiology and Biophysics. Offered: A.

CONJ 520 Anatomy and Autopsy (1/2) *Fligner* Students attend autopsies at UWMC affiliated hospitals. Objectives: (1) demonstration of normal anatomic relationships and features of unfixed cadavers; (2) demonstration of gross anatomical relationships in various pathological states; (3) follow-up of histological findings. Offered as elective concurrent with HUBIO 520P. Prerequisites: HUBIO 510P or equivalent, permission of instructor.

CONJ 550P Clinical Infectious Diseases (3) *Miller* Lecture series by faculty members from various departments, authorities in the field of clinically important infectious diseases. Lectures, reading assignments, and handouts emphasize epidemiology, clinical manifestations, laboratory findings, diagnosis, treatment, and prevention. Oriented for second-year medical students. Credit/no credit only. Prerequisite: HUBIO 521P or permission of coordinator, Department of Medicine. Offered: W.

CONJ 553P Nutrition for Physicians (1) *Lipkin* Basic nutritional concepts directed at second-year medical students. Controversial issues relating to diet and disease, with emphasis on application of scientific reasoning and pragmatism to the search for answers. Focuses on providing practical information relevant to the practice of a physician. Credit/no credit only. Pre-

requisites: HUBIO 514P, 524P, or equivalent. Offered: Sp.

CONJ 555P Human Oncology for Fourth-Year Medical Students (2) *Berger* Recapitulates the principles and practice of human oncology prior to the senior medical student starting residency. Includes cancer epidemiology, screening and prevention, practical tumor biology, including oncogenes, tumor suppressor genes, and molecular carcinogenesis, geriatric and pediatric cancer, and individual organ system involvement in terms of diagnosis and management.

CONJ 585 Surgical Anatomy (1-3, max. 12) *Graney* Guided dissection of selected regions, supplemented by conferences. Offered conjointly by the departments of Biological Structure and Surgery. Prerequisite: permission of department. Coordinator: Department of Biological Structure.

CONJ 677P Clinical Allergy and Immunology (*, max. 12) *Henderson (University of Washington Medical Center)* Clinic and office experience in diagnosing and managing allergic disease. Clinical conferences, hospital rounds on clinical immunology and allergy. Student may elect a flexible program, emphasizing adult or pediatric allergy. Prerequisites: MED 665P or basic clerkships in Departments of Family Medicine or Pediatrics. (Four weeks, full-time.) Offered: AWSpS.

CONJ 678P Pain Clinic Clerkship (8) *Egan, Loeser* Full-time, four-week clerkship emphasizing comprehensive care of patients with chronic pain from benign diseases and cancer. Faculty members from multiple departments provide student with didactic and bedside experiences; student member of treatment team. Involves both inpatient and outpatient activities. Prerequisites: completion of human biology series, MED 665P.

CONJ 680P Detoxification and Rehabilitation Program for Alcoholism and Drug Abuse (*, max. 16) *Walker* Supervised introduction to alcoholic detoxification and rehabilitation and drug abuse. Supervised clinical experience in a variety of alcoholism and drug abuse treatment programs; accompanied by a core series of lectures and discussions. For medical students only.

CONJ 697P International Exchange Clerkship (12) *Hunt* Participation in health care delivery systems in developing countries; observation of relationship of host country's traditional medicine with Western medicine. Students live in cross-cultural setting to better understand their own assumptions about health care and life styles. Offered: Sp.

CONJ 698P Foreign Medical Student Clerkship (*, max. 24) A limited number of students from foreign medical schools are accepted for individually designed clinical clerkships at available sites after all UWMC students are accommodated. Prerequisites: permission of Associate Dean for Academic Affairs, School of Medicine.

CONJ 699P Clinical Clerkships (*, max. 32)

Family Medicine

C408 Health Sciences

Family medicine is the discipline concerned with the continuing and comprehensive care of individuals and their families. The prime instructional goal of the department is the education and training of physicians who will apply the knowledge and skills of this and other medical disciplines in family practice. Implicit in this goal is the necessity for continual development of new knowledge and its application in the clinical activities of the department.

The Department of Family Medicine was founded in 1971 and is involved with instruction of medical stu-

dents in several ways. These include presentations in the basic curriculum of the first two years, clinical clerkships as part of the clinical core curriculum, and other elective courses open to all medical students. A graduate residency program in family practice provides training consistent with the standards of the American Board of Family Practice, the American Academy of Family Physicians, and the Council on Medical Education of the American Medical Association. Active teaching affiliations are maintained throughout the WAMI region at both undergraduate and graduate levels.

Family medicine fellowship training programs are available to develop teaching and research skills for future academic faculty.

Faculty

Chair

Ronald Schneeweiss

Professors

Berg, Alfred O. 1979; MD, 1974, Washington University; MPH, 1979, University of Washington; family medicine.

Chrisman, Noel J. * 1973, (Adjunct); PhD, 1966, University of California (Berkeley); community partnership research, clinical cultural competence, ethnic health beliefs and practices.

Coombs, John B. 1983; MD, 1972, Cornell University; rural health policy, nutrition and medicine.

Geyman, John P. 1976, (Emeritus); MD, 1960, University of California (San Francisco); family medicine.

Gordon, Michael J. * 1973; PhD, 1973, Michigan State University; family medicine.

Katon, Wayne J. 1976, (Adjunct); MD, 1976, University of Oregon.

Mayer, Jonathan D. * 1977, (Adjunct); PhD, 1977, University of Michigan; medical geography, clinical applications, philosophy.

Rosenblatt, Roger A. * 1977; MD, 1971, MPH, 1971, Harvard University; research into the organization and delivery of health services, rural health policy.

Schneeweiss, Ronald 1977; MChB, 1964, University of Capetown (South Africa); family medicine.

Associate Professors

Baldwin, Laura M. 1984; MD, 1980, University of Southern California; MPH, 1986, University of Washington; family medicine.

Eggertsen, Sam C. 1982; MD, 1976, University of Washington; family medicine.

Ellsbury, Kathleen E. 1982; MD, 1977, Johns Hopkins University; MPH, 1982, University of Missouri; family medicine.

Ellsworth, Allan J. 1981; PharmD, 1977, Philadelphia College of Pharmacy & Science; primary care, family medicine.

Gloyd, Stephen S. * 1986, (Adjunct); MD, 1973, University of Chicago; MPH, 1983, Harvard University; political economy, epidemiology, and primary health care in developing countries.

Greer, H. Thomas 1977; MD, 1974, University of Mississippi; MPH, 1979, University of Washington; family medicine.

Hart, L. Gary, 1987; PhD, 1985, University of Washington; rural health policy, medical geography.

Leversee, John H. 1973, (Emeritus); MD, 1952, University of Minnesota; family medicine.

Losh, David Paul 1992; MD, 1974, University of Kansas; family medicine.

Neighbor, William E. Jr. 1983; MD, 1979, University of Washington; family medicine and preventive cardiology.

Norris, Thomas E. 1988; MD, 1973, University of Texas (Galveston); rural health policy, primary care policy, geriatrics.

Stevens, Nancy G. * 1982; MD, 1979, MPH, 1982, University of Washington; family medicine.

Taplin, Stephen H. 1983; MD, 1978, University of California (Davis); MPH, 1985, University of Washington; family medicine.

Taylor, Thomas R. 1979; MChB, 1957, PhD, 1971, University of Glasgow (UK); family medicine.

Walker, Edward A. 1983; MD, 1983, University of Washington.

Assistant Professors

Church, Lili Lucille 1992; MD, 1985, University of Iowa; family medicine.

Crittenden, Robert A. 1981, (Adjunct); MD, 1976, MPH, 1987, University of Washington; health plans/policies.

Dobie, Sharon A. 1987; MCP, 1971, University of California (Berkeley); MD, 1979, University of California (San Francisco); family medicine.

Gibbons, Mary S. 1994; MD, 1985, Thomas Jefferson University; family medicine.

Goldbaum, Gary M. * 1989, (Adjunct); MD, 1978, University of Colorado (Denver); MPH, 1989, University of Washington; the epidemiology of human behaviors that increase risk for disease.

Oliver, Lynn M. 1988; MD, 1983, University of Washington; family medicine.

Saver, Barry G. 1994; MD, 1983, Columbia University; MPH, 1991, University of Washington; family medicine.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Course numbers with a P suffix are not graduate courses and are restricted to medical student enrollment only.

FAMED 499 Undergraduate Research (*) Research activities arranged with University-based or community physicians in diversified areas relating to family medicine. Various research philosophies and investigative methods are introduced. Prerequisite: permission of course coordinator. Offered: AWSpS.

FAMED 501P Introduction to Family Medicine: Preceptorship (2.5) Students spend one morning per week for one quarter working with a practicing community family physician. Prerequisites: first- and second-year medical students, permission of course coordinator. Offered: AWSpS.

FAMED 505P Rural/Urban Preceptorship (*, max. 12) Opportunity to work in a variety of medical settings in rural and urban areas of Washington, Alaska, Idaho, and Montana. Prerequisite: permission of instructor. Offered: AWSpS.

FAMED 555 P-Wilderness Medicine (2) Two-week elective provides didactic and field experience for third-year medical students in types of medical emergencies and clinical problems unique to rural and wilderness communities, including trauma, survival hypothermia, altitude, frostbite, heat illness, lightning, and river rescue.

FAMED 640P Clinical Clerkship In Family Medicine—Boise (12) Stresses ambulatory primary care with emphasis on comprehensive, integrated care to patients of both sexes and all ages. Student functions

as clerk in community/residency site. Participates in care of assigned patients, using office, hospital, home, community resources. Prerequisite: third- or fourth-year medical students. Offered: AWSpS.

FAMED 641P Clinical Clerkship In Family Medicine—Spokane (12) For description and prerequisite, see 640P. Offered: AWSpS.

FAMED 642P Clinical Clerkship In Family Medicine—Madigan (12) For description and prerequisite, see 640P. Offered: AWSpS.

FAMED 643P Clinical Clerkship In Family Medicine—Tacoma (12) For description and prerequisite, see 640P. Offered: AWSpS.

FAMED 644P Clinical Clerkship In Family Medicine—University of Washington Medical Center (12) For description and prerequisite, see 640P. Offered: AWSpS.

FAMED 645P Clinical Clerkship In Family Medicine—Group Health (12) For description and prerequisite, see 640P. Offered: AWSpS.

FAMED 646P Clinical Clerkship In Family Medicine—Swedish (12) For description and prerequisite, see 640P. Offered: AWSpS.

FAMED 647P Clinical Clerkship In Family Medicine—Providence (12) For description and prerequisite, see 640P. Offered: AWSpS.

FAMED 648P Clinical Clerkship In Family Medicine—Renton Valley (12) For description and prerequisite, see 640P. Offered: AWSpS.

FAMED 649P Clinical Clerkship In Family Medicine, Olympia (12) For description and prerequisite, see 640P. Offered: AWSpS.

FAMED 650P Clinical Clerkship In Family Medicine—Anacortes (12) For description and prerequisite, see 640P. Offered: AWSpS.

FAMED 651P Clinical Clerkship In Family Medicine—Omak (12) For description and prerequisite, see 640P. Offered: AWSpS.

FAMED 652P Clinical Clerkship In Family Medicine—Spokane Valley (12) For description and prerequisite, see 640P. Offered: AWSpS.

FAMED 653P Clinical Clerkship In Family Medicine—Anchorage (12) For description and prerequisite, see 640P. Offered: AWSpS.

FAMED 654P Clinical Clerkship In Family Medicine—Ketchikan (12) For description and prerequisite, see 640P. Offered: AWSpS.

FAMED 656P Clinical Clerkship In Family Medicine—Whitfish (12) For description and prerequisite, see 640P. Offered: AWSpS.

FAMED 657P Clinical Clerkship In Family Medicine—Pocatello (12) For description and prerequisite, see 640P. Offered: AWSpS.

FAMED 658P Clinical Clerkship In Family Medicine—Sea Mar Clinic (12) For description and prerequisite, see 640P. Offered: AWSpS.

FAMED 659P Clinical Clerkship In Family Medicine—Country Doctor (12) For description and prerequisite, see 640P. Offered: AWSpS.

FAMED 660P Clinical Clerkship In Family Medicine, Yakima (12) For description and prerequisites, see 640P. Offered: AWSpS.

FAMED 661P Clinical Clerkship In Family Medicine, Bremerton (12) For description and prerequisites, see 640P. Offered: AWSpS.

FAMED 670P Advanced Preceptorship In WAMI Area (*, max. 24) Students gain experience, knowledge, and skills needed to care for rural, Native Ameri-

can Indian, and other ethnic or underserved populations in Washington, Alaska, Montana, and Idaho. Prerequisites: third- or fourth-year medical students, permission of course coordinator. Offered: AWSpS.

FAMED 671P Advanced Preceptorship in United States (*, max. 24) Supplemental experience in rural/urban practice or a family medicine department in a setting not already established through the family medicine curriculum. Prerequisites: third- or fourth-year medical students, permission of course coordinator. Offered: AWSpS.

FAMED 672P Advanced Preceptorship International (*, max. 24) For medical students desiring primary care experience abroad. Special project deals with influences of social, cultural, educational, and economic forces on health care delivery. Prerequisite: third- or fourth-year medical students, permission of course coordinator. Offered: AWSpS.

FAMED 680P Traditional Indian Medicine Clerkship in Primary Care Setting (*, max. 12) Study in urban Indian primary care setting of ways western physician collaborate with traditional Indian healers in the provision of health care to an urban Indian population. Prerequisites: completion of required third-year clerkship, UCONJ 530 or permission of instructor. Offered: AWSpS.

FAMED 681P Indian Health Care Clerkship (*, max. 12) Individually designed learning experience allows student to choose training opportunities. Potential learning experiences include Indian IHS Clinics, Tribal 638 Health Programs, IHS Public Health Program, Urban Indian Health programs, Tribal Council Health activities, and Tribal/IHS Alcoholism Treatment programs. Prerequisite: completion of required third-year clerkships, UCONJ 530, and permission of instructor. Offered: AWSpS.

FAMED 698P Clinical Clerkship in Family Medicine, Away (12) For description and prerequisites, see 640P. Offered: AWSpS.

Human Biology Courses

See page 56 for explanation of course numbers, symbols, and abbreviations.

Course numbers with a P suffix are not graduate courses and are restricted to medical student enrollment only. This sequence is required for all medical students. Other students may enroll by permission of the Assistant Dean for Curriculum, School of Medicine.

HUBIO 500P Medical Practice Preceptorship at WAMI Sites (1, max. 3) Personal experience with, and insight into, medical practice situations. Student is stationed with carefully selected clinical faculty members in their offices in accordance with the student's preference of discipline at the WAMI sites. Registration limited to first-year medical students at WAMI sites. Offered: AWSpS.

HUBIO 501P Human Biology Special Projects (*) Hunt, MacLaren Designed for medical students electing a special study project related to the Introduction to Clinical Medicine or other human biology courses, which are offered during the first and second years in the School of Medicine. Primarily intended for students in remedial or extended programs. Prerequisite: permission of assistant dean for curriculum. Offered: AWSpS.

HUBIO 505 P-WAMI Preceptorship (1) Opportunity for first-year medical students at WAMI sites to gain personal experience with medical practice situations by being assigned to selected clinical faculty members in their offices. Offered: ASP.

HUBIO 510P Microscopic Anatomy: Histology (3) Nameroff Lectures and laboratories in microscopic anatomy designed to provide the principles and concepts of histology, to define the morphological characteristics of the cells, tissues, and organs of the human body, and to relate this information to functional processes studied in concurrent and subsequent courses. Offered: A.

HUBIO 511P Gross Anatomy and Embryology (7) Rosse Structural organization of human body at the macroscopic level to provide a foundation for physical examination and functional assessment of the human organism. Integrates embryological development with study of the cadaver and examination of the normal living body. Concentrates on exploration of the body cavities and the viscera they contain. Offered: A.

HUBIO 512P Mechanisms in Cell Physiology (5) Crill Physiology of the cell membrane, including ionic and electrical potential gradients; active transport, excitability, and action potentials; biophysics of sensory receptors; neuromuscular transmission; muscle energetics and contractility; spinal reflexes and central synaptic transmission; autonomic nervous system; energy metabolism and temperature regulation; epithelial transport; gastrointestinal motility and secretions. Offered: A.

HUBIO 513P- Introduction to Clinical Medicine (1) Gibbons Instruction in communication skills and interview techniques to form the basis for the doctor-patient relationship and for the skills of communicating with patients. The patient profile is obtained. Attention to developing comfort in the physician role. Offered: A.

HUBIO 514-524 P-Biochemistry I-A-B (4-3) Walsh Classical molecular and cellular biochemistry, cellular physiology and molecular genetics. Metabolic interrelationships as they occur in the individual stressed and related to disturbances in disease states. Offered: A-W.

HUBIO 516-526 P-Systems of Human Behavior I-A-B (3-1) Walker Effects of behavioral factors in major management problems faced in medical practice relating to cultural background, social role, sexual identity, and belief systems. Acquisition of skills in analyzing behavior, defining objectives, and designing precise treatment strategies. Offered: A-W.

HUBIO 520P Cell and Tissue Response to Injury (6) Norwood Patterns of cell and tissue response to injury. Mechanisms of cell injury, the inflammatory process, immunology, immunopathology, thrombosis, normal and abnormal growth, neoplasia, clinicopathological correlation. Offered: W.

HUBIO 521-534P Natural History of Infectious Disease and Chemotherapy I-A-B (4-2) Moseley Pathogenesis and immunity of infectious diseases, natural barriers. Microbiology, epidemiology, clinical manifestations and control of representative bacterial, fungal, parasitic, and viral infectious diseases. Chemotherapeutics and principles of chemotherapy. Sterilization, principles of asepsis, nosocomial and iatrogenic infections and their prevention. Offered: W-ASP.

HUBIO 522P- Introduction to Clinical Medicine (2) Gibbons Medical history is introduced and instruction in data collection is begun. Experience in conducting medical interviews with patients to obtain the medical history and patient profile. Special problems related to interviewing are addressed. Offered: W.

HUBIO 523P Introduction to Immunology (2) Perlmuter Basic concepts such as antigens; antibodies; complement; B- and T-lymphocyte function, including interactions with each other and with accessory cells; immunological tolerance; major histocompatibility complex; and role of these basic concepts in immunopathology (immunodeficiencies, hypersensitivities, autoimmunity, blood transfusion, and transplantation). Offered: W.

HUBIO 530P Epidemiology (2) Becker Community health and disease, including assessment of disease risk and mechanisms of epidemic detection, spread, and control; interpretation of research design, data analysis, bias source; and clinical epidemiology, including evaluation and application of diagnostic tests, natural history of disease, and quantitative aids for clinical decision making. Offered: Sp.

HUBIO 531P Head, Neck, Ear, Nose, and Throat (5) Graney Gross anatomy (including skull, pharynx, and larynx), audition and balance, physiology and clinical evaluation, maxillofacial disorders, diseases of nasal passages, nasopharynx and oropharynx, accessory sinuses. Physical examination. Offered: Sp.

HUBIO 532P Nervous System (6) Reh Integrated approach to normal structure and function of the nervous system, including the eye. Neuropathological examples, as well as clinical manifestations of neurological disease are presented. Offered: Sp.

HUBIO 535P- Introduction to Clinical Medicine (4) Goldstein Adult screening physical examination is taught through the use of lecture, audiovisual aids, and small-group tutorial, where students in supervised setting practice the physical examination on one other. Further practice in the performance and recording of the patient profile and medical history. Offered: Sp.

HUBIO 540P Cardiovascular System (5.5) Brengelmann Interdisciplinary approach to cardiovascular medicine, including anatomy, physiology, radiology, pathology, medicine, and surgery. Function of the cardiovascular system in health and disease. Offered: A.

HUBIO 541P Respiratory System (4) Culver Interdisciplinary approach to the respiratory system, including anatomy of thorax and lungs, ventilation mechanics, blood-gas transport, gas exchange, acid-base balance, and the physiology and pathology of obstructive, restrictive, and pulmonary-vascular diseases. Offered: A.

HUBIO 542-550-560 P-Introduction to Clinical Medicine (2.5-3.5-5) McArthur Advanced instruction in interview technique, history taking, and physical examination, with emphasis on (542) detection of abnormalities, (550) identification of problems and correlation of findings with pathophysiological mechanisms, and (560) Introduction to clinical and laboratory diagnosis. Offered: A-W-Sp.

HUBIO 543P Principles of Pharmacology I (4) Vincenzi Includes general principles of pharmacology and the specific pharmacology of major drugs acting on the autonomic and cardiovascular systems. Offered: A.

HUBIO 544P Endocrine System (2.5) Brunzell Normal, gross, and microscopic anatomy and physiology of the endocrine system. Illustrations examining the clinical relevance of homeostasis, feedback, and other controlling mechanisms previously learned. Endocrine integration of metabolism. Clinically important endocrine pathophysiology. Offered: A.

HUBIO 546P Systemic Pathology (2) Schmidt Multidisciplinary approach to some diseases that affect more than one organ system (nervous, cardiovascular, respiratory) and that are caused by different mechanisms (congenital, inflammatory, vascular, traumatic, metabolic, neoplastic). Offered: A.

HUBIO 551P Gastro-Intestinal System (4) Saunders Anatomy of the gastrointestinal system; physiology and pathology of digestion and hepatic function; and physical and laboratory examination. Offered: W.

HUBIO 552P Hematology (3) Broudy Familiarizes students with the basic pathophysiological mechanisms leading to disturbances of red cell, white cell, and platelet production, as well as abnormalities of hemostasis presenting clinical problems. Pathophysiology.

ology, rather than minute details of individual disease, is stressed. Offered: W.

HUBIO 553P Musculoskeletal System (4.5) Teitz Gross, surface, applied, and x-ray anatomy of system, including entire spine but excluding head and neck. Histology of bone, cartilage, tendon-myotendinous junction and joints. Musculoskeletal trauma and healing. Pathology and clinical manifestations of other degenerative, inflammatory, metabolic, nutritional, and congenital disorders. Physical examination. Offered: W.

HUBIO 554P Genetics (2.5) Horwitz Review of basic genetic principles and their applications in clinical medicine. Includes human chromosomal disorders; patterns of inheritance, genetic counseling, amniocentesis; pathogenesis of hereditary diseases, monogenic and multifactorial; role of genetics in common diseases; behavioral genetics; drug-gene interactions; and prevention and treatment of genetic diseases, including prenatal diagnosis and population screening. Offered: A.

HUBIO 555P Medicine, Health, and Society (3.5) Lafferty Interrelationships between provision of medical care and nonbiological factors that influence health. Includes relative importance of society, environment, and individual choice in determining health status; impact of organizational, economic, and political influences on medical practice and choice; their importance in decision making. Offered: W.

HUBIO 562P Urinary System (4) Cooper Anatomy, physiology, and pathology of the kidney, ureter, bladder, and prostate; pathophysiology and treatment of common fluid and electrolyte problems; renal pharmacology; major clinical urinary system syndromes, with current diagnostic approaches and therapy. Offered: Sp.

HUBIO 563P Systems of Human Behavior II (3) N. Ward Major psychiatric disorders are defined and described, and a systematic approach to differential diagnosis is presented. Conceptual development, pathogenesis, epidemiology, nomenclature, and the terminology used in psychiatry are discussed. Offered: Sp.

HUBIO 564P Principles of Pharmacology II (3) Horita Lectures and conferences on drugs that act on the central nervous system. Emphasis on physiological and biochemical mechanisms, with consideration of therapeutic and adverse effects. Offered: Sp.

HUBIO 565P Reproduction (3.5) Gaddum-Rosset Normal development of the human reproductive system. Sexual differentiation, puberty, endocrine control of testicular and ovarian function, gamete biology, fertilization, implantation, immunology and endocrinology of pregnancy, labor and delivery, pathology of the male and female reproductive organs, contraception, prolactin and lactation, aging and infertility. Offered: Sp.

HUBIO 567P Skin System (2) Raugi Gross and microscopic anatomy. Physiology, protection, temperature control, pigmentation, and photosensitivity. Pathology and genetics of skin abnormalities, including tumors. Introduction to clinical evaluation, including physical examination and illustrating examples of inflammatory, vascular, immunological (including drug hypersensitivity), and neoplastic diseases. Offered: A.

HUBIO 598P WAMI Non-Clinical Selectives (*) Courses offered at WAMI university sites designed to satisfy the non-clinical selective graduation requirement for medical students. Offered: ASP.

HUBIO 599P Independent Study in Medical Science (8) Chu Independent research with faculty sponsor and completion of paper as partial fulfillment of non-clinical selective graduation requirement. Offered: Sp.

Immunology

H564 Health Sciences

The science of immunology began in the nineteenth century as an outgrowth of microbiology. During the past few decades, immunology has emerged as a truly separate discipline, with a specialized technical armamentarium and a conceptual base that has had profound general impact on research in molecular and cellular biology. Indeed, immunological questions provide some of the most exciting intellectual challenges in contemporary science. In recognition of these facts, the University of Washington established the Department of Immunology in 1989. The following information is provided as a guide to those students interested in a Ph.D. degree in this important new area.

Research facilities in the Department of Immunology include state-of-the-art equipment for gene manipulation and flow cytometry. A departmental library, extensive computer resources, and conference rooms are also available for students. Members of the faculty hold joint appointments in the departments of Biochemistry, Bioengineering, Medicine, Molecular Biotechnology, and Pediatrics, and the department participates in the Molecular and Cellular Biology Program. Close interaction therefore exists between the Department of Immunology and other research units in the health sciences.

Students are admitted for autumn quarter; the application deadline is February 1. The requirements for admission are flexible; however, most successful applicants will have completed survey courses in biology, chemistry, and physics, one year of organic chemistry, and mathematics through integral calculus. Prior exposure to immunology through formal course work or laboratory research is desirable. All immunology graduate students are assured of financial support for the term of their studies.

Correspondence and Information

Graduate Program Coordinator
Department of Immunology, Box 357650
(206) 685-3955; FAX (206) 616-4561
email: immuno@nucleus.immunol.washington.edu

Faculty

Chair

Roger M. Perlmutter

Professors

Aderem, Alan A. 1996; PhD, 1979, University of Cape Town (South Africa); signal transduction and the cytoskeleton; mechanisms of macrophage targeting and differentiation.

Bevan, Michael J. * 1990; PhD, 1972, National Institute for Medical Research (UK); T lymphocyte development and specificity.

Clark, Edward A. * 1984, (Adjunct); PhD, 1977, University of California (Los Angeles); lymphocyte surface molecules, lymphocyte activation and cell communication.

Greenberg, Philip D. * 1978; MD, 1971, State University of New York (Downstate); molecular, cellular, viral, and tumor immunology.

Hood, Leroy E. * 1992; PhD, 1968, California Institute of Technology; molecular immunology, large-scale DNA mapping and sequencing, molecular evolution.

Lemmark, Ake 1994, (Adjunct); MD, 1970, PhD, 1971, University of Umea; metabolism and endocrinology.

Nepom, Gerald T. * 1982, (Affiliate); PhD, 1977, MD, 1978, University of Washington; immunogenetics of human MHC, molecular and cellular immunology, immunoregulation, autoimmunity.

Perlmutter, Roger M. * 1984; MD, 1979, PhD, 1979, Washington University; molecular immunology and signal transduction in hematopoietic cells.

Pious, Donald A. * 1964; MD, 1956, University of Pennsylvania; antigen processing, function of nonclassical MHC genes, MHC gene regulation.

Van Den Engh, Ger * 1992, (Adjunct Research); PhD, 1976, University of Leiden (Netherlands); flow cytometry, quantitative cytogenetics, instrument design and development.

Wilson, Christopher B. * 1980; MD, 1972, University of California (Los Angeles); immunology, rheumatology, infectious diseases.

Associate Professors

Concannon, Patrick J. * 1989, (Affiliate); PhD, 1984, University of California (Los Angeles); development of the human T cell receptor repertoire, genetics of diabetes and ataxia-telangiectasia.

Farr, Andrew G. * 1982, (Adjunct); PhD, 1975, University of Chicago; cell interactions governing lymphocyte production and function.

Fink, Pamela J. * 1990; PhD, 1981, Massachusetts Institute of Technology; T cell differentiation, tolerance induction, molecular and cellular immunology.

Lewis, David B. * 1988, (Adjunct); MD, 1981, University of California (San Francisco); T lymphocyte cytokine biology, infectious diseases.

Milner, Eric C. B. * 1987, (Affiliate); PhD, 1980, University of Montana; autoantibodies, antibody repertoire, immunoglobulin polymorphism, autoimmune disease.

Assistant Professors

Foot, Jefferson * 1994, (Affiliate); PhD, 1985, University of California (Berkeley); biophysics of immune maturation, antibody engineering and immunotherapy, x-ray crystallography.

Goverman, Joan M. * 1992, (Adjunct); PhD, 1981, University of California (Los Angeles); immune recognition and tolerance, autoimmunity, T cell development, activation, antibody diversity.

Hockenbery, David M. * 1994, (Adjunct); MD, 1982, Washington University; gastroenterology.

Pullen, Ann M. * 1991; PhD, 1987, Cambridge University (UK); thymic and extrathymic T cell development.

Rudensky, Alexander Y. * 1992; PhD, 1986, Garbrichevsky Institute for Epidemiology & Microbiology; antigen processing and presentation, T-cell recognition.

Strong, Roland K. * 1994, (Affiliate); PhD, 1990, Harvard University; structural molecular biology and crystallography of proteins mediating immune responses to antigens.

Instructor

Levin, Steven 1995, (Acting); PhD, 1993, University of Washington; signal transduction mechanisms in the function and development of hematopoietic cells.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

IMMUN 441 Introduction to Immunology (4) NW General properties of immune responses; cells and tissues of immune system; lymphocyte activation and specificity; effector mechanisms; immunity to microbes; immunodeficiency and AIDS; autoimmune diseases; transplantation. Prerequisites: BIOL 203, organic chemistry, or permission of instructor, junior standing or above; recommended: biochemistry, cell biology and/or genetics. Offered: jointly with MICROM 441; A.

IMMUN 499 Undergraduate Research (*, max. 24) Investigative work on a variety of topics, including mechanisms of antigen recognition, T-cell development and differentiation, immunogenetics, lymphocyte activation, MHC gene structure and function, retrovirology, and the pathogenesis of autoimmune diseases, among others. Prerequisite: permission of instructor. Offered: AWSpS.

IMMUN 532 Advanced Immunology (3) Examines the molecular and cellular basis of immune function. Students must have completed a baccalaureate degree in a biological specialty, and be conversant with molecular genetics. Topics include antigen receptor structure, antigen presentation, and the biochemistry of lymphokines. Offered: W.

IMMUN 533 Developmental Immunology (3) Draws on background materials offered in 532, placing the molecular and cellular biology of immune function in an appropriate developmental context. Topics include hematopoiesis, lineage commitment in lymphocytes, and the development of immune responsiveness. Prerequisite: 532 or permission of instructor. Offered: Sp.

IMMUN 534 Central Issues in Immunology (2, max. 4) Presentations by participants of topics relating to the broad study of immunology. Credit/no credit only. Prerequisite: graduate standing in Immunology. Offered: Sp.

IMMUN 550 Selected Topics in Immunology (1, max. 30) Formal seminar-discussion course for advanced students focused on recent developments in the field and consisting of literature research and intensive in-depth study of important and timely topics. Credit/no credit only. Prerequisite: permission of instructor. Offered: AWSpS.

IMMUN 551-558, 560-562, 564-567 Current Research Conferences Weekly group conferences concerning ongoing graduate students and postdoctoral research in immunology. Students may register for more than one conference each quarter. Credit/no credit only. Prerequisite: permission of instructor. (Only 30 credits may be counted toward degree.)

IMMUN 551 Regulation of T Cell-Dependent B Cell Maturation (1, max. 30) Credit/no credit. Offered: AWSpS.

IMMUN 552 Immunogenetics and Autoimmunity (1, max. 30) Credit/no credit. Offered: AWSpS.

IMMUN 553 Immunogenetics and Immunobiology (1, max. 30) Credit/no credit. Offered: AWSpS.

IMMUN 554 Immunogenetic Aspects of Human Autoimmunity (1, max. 30) Credit/no credit. Offered: AWSpS.

IMMUN 555 Model of Autoimmune Disease and Their Regulation (1, max. 30) Credit/no credit. Offered: AWSpS.

IMMUN 556 Immune Recognition, Autoimmunity, and Immunogenetics (1, max. 30) Credit/no credit. Offered: AWSpS.

IMMUN 557 Thymic Environment (1, max. 30) Credit/no credit. Offered: AWSpS.

IMMUN 558 Molecular Biology of the Human Antibody Repertoire (1, max. 30) Credit/no credit. Offered: AWSpS.

IMMUN 559 Molecular Biology of the Immune System (1, max. 30) Credit/no credit. Offered: jointly with BIOC 579.

IMMUN 560 Progress in T Cell Research (1, max. 30) Credit/no credit. Offered: AWSpS.

IMMUN 561 Mechanisms of Peripheral Tolerance (1, max. 30) Credit/no credit. Offered: AWSpS.

IMMUN 562 Developmental Regulation of T Cell Function (1, max. 30) Credit/no credit. Offered: AWSpS.

IMMUN 564 Cellular/Molecular Regulation of T Cell Responses (1, max. 30) Credit/no credit. Offered: AWSpS.

IMMUN 565 T Cell Development and Cytokine Biology (1, max. 30) Credit/no credit. Offered: AWSpS.

IMMUN 566 T Cell Development and Recognition (1, max. 30) Credit/no credit. Offered: AWSpS.

IMMUN 567 Antigen Processing and Presentation (1, max. 30) Credit/no credit. Offered: AWSpS.

IMMUN 573 Immunology Seminar Series (1, max. 30) Weekly discussion in which original research results are presented and discussed. Emphasis is on new and original contributions to field of immunology and related areas; occasional seminars are concerned with review of important topics. Credit/no credit only. Prerequisites: firm background in immunology, permission of instructor. Offered: AWSpS.

IMMUN 599 Introduction to Immunology Research (1-6) Current problems in immunological research. Credit/no credit only. Prerequisite: permission of instructor. Offered: AWSpS.

IMMUN 600 Independent Study or Research (*) Offered: AWSpS.

IMMUN 700 Master's Thesis (*) Offered: AWSpS.

IMMUN 800 Doctoral Dissertation (*) Offered: AWSpS.

Laboratory Medicine

NW120 University of Washington Medical Center

The Department of Laboratory Medicine includes divisions of clinical chemistry, hematology, microbiology, coagulation, immunology, genetics, virology, and medical informatics. In addition to courses for medical students, the department offers Bachelor of Science in Medical Technology and Master of Science degree programs. The department also provides residency training in clinical pathology for graduate physicians and postdoctoral training in several subspecialty areas of laboratory medicine.

Undergraduate Program

Bachelor of Science in Medical Technology

Medical technology is an interesting and rewarding health science profession. Individuals who enjoy studying the biological, chemical, and physical sciences find personal satisfaction and intellectual reward in employing scientific methods for the diagnosis and evaluation of disease. Advances in medical science and interest in health maintenance have resulted in an exponential growth in the diversity and volume of laboratory procedures. The medical technologist/clinical laboratory scientist is a creative, knowledge-based professional who performs assays, analyzes problems, and helps to evaluate test results.

The medical technology program is a four-year college curriculum supervised by the College of Arts and Sciences in the freshman and sophomore years (preprofessional, 90 credits) and by the Department of Laboratory Medicine in the junior and senior years (professional). Detailed program requirements and application material may be obtained from the Undergraduate Advising Center or the Department of Laboratory Medicine.

Admission Requirements: Completion of 90 quarter credits, or junior standing, is required for admission. Preprofessional requirements for admission include completion of the University writing, reasoning, and general education requirements. Writing and reasoning requirements include 5 credits English composition, plus a minimum 7 credits of additional writing-intensive courses, and 5 credits of quantitative reasoning. General education requirements include a minimum of 40 credits from three Areas of Knowledge: Visual, Literary & Performing Arts; Individuals & Societies; the Natural World. A minimum of 10 credits must be earned in each of the three Areas of Knowledge. (Students who began college before autumn 1985 complete a different set of requirements. See adviser for details.)

Graduation Requirements: Detailed requirements may be obtained from the Medical Technology Program Director, Department of Laboratory Medicine, Box 357110. A minimum of a C grade in all laboratory medicine courses and a GPA of 2.00, both cumulative and in required courses, is required for graduation.

The medical technology curriculum is accredited by the Committee on Allied Health Education and Accreditation. Graduates are eligible and are encouraged to take an appropriate examination to become certified medical technologists/clinical laboratory scientists. Examples of practice in medical technology include service in hospitals and clinics; and research in industrial, public health, and medical laboratories.

Graduate Program

The Department of Laboratory Medicine offers a graduate program leading to the Master of Science degree. Each student in the program selects one of the major areas of concentration (e.g., chemistry, coagulation, hematology, immunology, microbiology, virology). The chemistry concentration is approved by the Commission on Accreditation in Clinical Chemistry. The other pathways have no comparable accrediting agencies.

A thesis based upon independent research in the student's selected area of concentration is required. Course requirements vary with the concentration selected. However, the program is flexible and permits each student (with the help of an adviser) to plan a course of study that meets individual needs. A full-time student normally completes the program in two years. The program prepares qualified candidates for supervisory positions in clinical laboratories and for careers in investigation or teaching in an area of clinical laboratory science.

Admission Requirements

Applicants must have a B.S. or B.A. degree in a field appropriate to the graduate study (medical technology, biochemistry, biology, chemistry, or microbiology) and meet the Graduate School requirements for admission. The applicant must also be certified as a medical technologist/clinical laboratory scientist, or as a specialist in a particular area of laboratory medicine by one of the national certifying agencies. In addition, applicants must take the Graduate Record Examination aptitude test.

Major Requirements

Students must meet the minimum requirements for a master's degree as stated in the Graduate School section of this catalog. In addition, a core of courses is required for all students in the program as well as additional specific course requirements for the various major areas of concentration.

Financial Aid

Research assistantships may be available for second year students. Opportunities for part-time employment in departmental laboratories may be available, and applications will be considered.

Research Facilities

Each division in the department is equipped with modern facilities for research in its specialty area.

Correspondence and Information

Graduate Program Coordinator
Department of Laboratory Medicine, Box 357110

Residency Training Program

The department provides residency training in clinical pathology (laboratory medicine) for graduate physicians in cooperation with the Department of Pathology. Persons who complete the program are eligible for certification by the American Board of Pathology.

Correspondence and Information

Resident Program Director
Department of Laboratory Medicine, Box 357110

Faculty

Chair

James Fine

Professors

Benjamin, Denis R. * 1975; MBChB, 1968, University of Witwatersrand (South Africa); pediatric pathology, hematopathology, nutrition, circadian rhythms.

Corey, Lawrence * 1977; MD, 1971, University of Michigan; laboratory medicine: diagnosis, therapy, and pathogenesis of viral infections, AIDS virus.

Coyle, Marie B. * 1973; PhD, 1965, Kansas State University; DNA probes and GLC for rapid identification of mycobacteria and corynebacteria.

Detter, James C. * 1969; MD, 1962, University of Kansas; laboratory diagnosis of genetic disorders, red-cell disorders and laboratory instrumentation.

Kaplan, Alex 1960, (Emeritus); PhD, 1936, University of California (Berkeley); clinical chemistry.

Kenny, Margaret * 1970; PhD, 1968, University of Illinois; clinical chemistry, new technologies for in vivo clinical biochemical analysis.

Labbe, Robert F. * 1957, (Emeritus); PhD, 1951, Oregon State University; porphyrin disorders, nutritional biochemistry.

Plorde, James J. * 1967; MD, 1959, University of Minnesota; infectious diseases, antibiotic-resistant nosocomial infections.

Raisys, Vidmantas A. * 1971; PhD, 1969, State University of New York (Buffalo); clinical toxicology, therapeutic drug monitoring.

Schmer, Gottfried * 1969; MD, 1956, University of Vienna (Austria); synthesis of artificial organs, molecular engineering of antitumor enzymes.

Strandjord, Paul E. * 1969, (Emeritus); MD, 1959, Stanford University; clinical chemistry, leadership and management.

Associate Professors

Ashley, Rhoda L. * 1981; PhD, 1977, University of California (Davis); pathogenesis of viral infections, immune response to herpes, rapid diagnosis.

Chandler, Wayne L. * 1984; MD, 1982, St Louis University; clinical chemistry, clinical coagulation, hematology.

Clayson, Kathleen J. * 1969, (Emeritus); MS, 1968, University of Minnesota; enzymology in clinical chemistry.

Coombs, Robert W. * 1988; PhD, 1977, MD, 1981, Dalhousie University (Canada); diagnosis and pathogenesis of HIV infection.

Delaney, Collene J. * 1975; PhD, 1972, University of Illinois; clinical chemistry, the study of diabetes and alcoholism.

Finé, James * 1977; MD, 1972, MS, 1977, University of Minnesota; enzymology, medical computer applications.

Fritsche, Thomas R. * 1984; MD, 1981, PhD, 1984, University of Minnesota; systematics and ecology of animal parasites; medical microbiology.

Opheim, Kent E. * 1977; PhD, 1973, Cornell University; therapeutic drug monitoring, drug assay development, pediatric clinical chemistry.

Rutledge, Joe C. * 1989; MD, 1976, Vanderbilt University; genetic disease pathology, human embryology, mouse mutagenesis, pediatric chemistry/hematology.

Schiller, Harvey S. * 1972; MD, 1966, Washington University; clinical chemistry, hematology, interpretation of laboratory data.

Tait, Jonathan F. * 1983; MD, 1983, PhD, 1983, Washington University; biochemistry of blood coagulation, laboratory diagnosis of genetic disorders.

Wener, Mark H. * 1980; MD, 1974, Washington University; diagnostic immunology, immune complex diseases.

Assistant Professors

Astion, Michael L. * 1993; PhD, 1989, MD, 1989, University of Pennsylvania; neural networks, multi media computer-aided tutorials, immunology.

Behrens, Joyce A. 1971; MS, 1971, University of Minnesota; clinical hematology and clinical coagulation methodologies.

Gretch, David R. * 1990; PhD, 1990, MD, 1990, University of Iowa; research and diagnostics related to viral hepatitis.

Le Crone, Carol N. * 1967; MS, 1966, Colorado State University; hematology, hemoglobinopathies.

McGonagle, Lee Anne 1970; MPH, 1969, University of Michigan; clinical microbiology, procedures for diagnostic bacteriology.

Sabath, Daniel E. * 1993; PhD, 1989, MD, 1989, University of Pennsylvania; regulation of gene expression in hematopoietic cells.

Szabo, La Verne 1970, (Emeritus); MS, 1970, University of Washington; general clinical chemistry, heavy metals in clinical chemistry.

Toivola, Pertti T. 1986; PhD, 1972, University of Washington; clinical chemistry, immunochemistry, trace metals in clinical chemistry.

hematological diagnostic studies. Prerequisite: permission of instructor. Offered: W.

LAB M 322 Medical Technology: Introductory Clinical Chemistry (5) Raisys Lecture and laboratory covering the theoretical and practical concepts associated with testing procedures performed in clinical chemistry. Prerequisite: permission of instructor. Offered: A.

LAB M 418 Topics in Clinical Chemistry (5) Raisys, Toivola Lecture and laboratory exercises covering fundamentals of instrumentation, methodology, and quality control in the clinical chemistry laboratory. Prerequisite: 322, or permission of instructor. Offered: Sp.

LAB M 419 Clinical Coagulation (3.5) Behrens Lecture and laboratory covering the theory and pathology of coagulation with inclusion of selected diagnostic procedures. Prerequisite: 321 or permission of instructor. Offered: S.

LAB M 420 Clinical Microscopy (3.5) LeCrone Lecture and laboratory covering urinalysis testing procedures and associated disease entities. Analysis of other body fluids. Methods of microscopic examination by use of bright-field, phase, and polarizing microscopy. Prerequisite: permission of instructor. Offered: S.

LAB M 421 Medical Microbiology (1/6) McGonagle Lecture and laboratory coverage of human infections and diagnostic procedures used for isolation, identification, and antimicrobial susceptibility testing of the microorganisms associated with disease. Prerequisite: permission of instructor. Offered: S.

LAB M 423 Clinical Chemistry (*, max. 24) Toivola Clinical testing related to protein and amino acid determinations, pancreatic function and intestinal absorption, renal and liver function, enzymes, electrolytes, and acid-base balance, lipids, toxicology, and endocrinology. Prerequisite: permission of instructor. Offered: AWSp.

LAB M 424 Clinical Microbiology (*, max. 24) McGonagle Clinical study of techniques used in the diagnostic microbiology laboratory, including specimen evaluation, culture identification, and antimicrobial susceptibility testing of clinically significant organisms and quality-control. Prerequisite: permission of instructor. Offered: AWSp.

LAB M 425 Clinical Hematology (*, max. 24) Behrens Study of procedures used in the clinical hematology and hemostasis laboratories, including cell counting, cellular morphology, tests useful in the diagnosis of red, white, and platelet cell disorders and routine hemostasis. Prerequisite: permission of instructor. Offered: AWSp.

LAB M 426 Clinical Immunohematology (7) LeCrone Clinical study of immunohematology of the red cells and hemagglutination techniques. Prerequisite: permission of instructor. Offered: W.

LAB M 427 Selected Studies in Laboratory Medicine (*, max. 24) Behrens, LeCrone, McGonagle, Raisys, Toivola Selected study in either one of the major scientific disciplines of laboratory medicine or multiple disciplines of this field or pursuance of a clinical research problem. Prerequisite: permission of instructor. Offered: AWSpS.

LAB M 499 Undergraduate Research (*) Specific project in clinical laboratory investigation. Credit/no credit only. Offered: AWSpS.

LAB M 501 Clinical Laboratory Diagnosis (3) Schmer Interpretation of diagnostic laboratory testing. Appropriate testing strategies in diverse clinical situations, principles, problems, and limitations. Lectures-discussions and illustrative case presentations and demonstrations. For third- and fourth-year medical students and graduate students. Recommended: HUBIO 560P. Offered: W.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Course numbers with a P suffix are not graduate courses and are restricted to medical student enrollment only.

LAB M 321 Medical Technology: Introductory Clinical Hematology (6) Behrens, LeCrone Lecture-laboratory coverage of the theoretical and practical concepts associated with cellular morphology, instrumentation, quality control, and selected

LAB M 502 Laboratory Medicine Grand Rounds (1, max. 6) *Dettler* Grand rounds are concerned with current topics in the field of laboratory medicine. Credit/no credit only. Offered: AWSp.

LAB M 510 Laboratory Medicine Research Conference (1, max. 6) *Tait* Presentation and discussion of ongoing research and development projects by faculty, residents, fellows, and graduate students. Open to graduate students in laboratory medicine and other medical sciences. Credit/no credit only. Prerequisite: permission of instructor. Offered: AWSp.

LAB M 520 Seminar in Organization and Management in Laboratory Medicine (3) *Chandler* Core course for the Master of Science degree in laboratory medicine. Prerequisite: graduate student standing in laboratory medicine or permission of instructor. Offered: odd years; Sp.

LAB M 521 Advanced Laboratory Hematology (1, max. 6) *Dettler* Lectures on laboratory diagnosis in clinical hematology. Emphasis on clinicopathological correlation. For laboratory medicine graduate students with special interest in diagnostic clinical hematology. Credit/no credit only. Prerequisites: graduate standing and permission of instructor. Offered: AWSp.

LAB M 522 Hematopathology Seminar (2) *Sabath* Identification of normal lymphocyte and bone marrow subpopulations, diagnosis of leukemias, lymphomas, and benign conditions that resemble them. Emphasis on histopathology, cytochemical, immunological, and molecular markers. Clinicopathologic correlation. Offered: jointly with PATH 522; even years; W.

LAB M 590P Research Projects in Laboratory Medicine (*) *Schmer* Opportunity for laboratory experience on a research problem related to laboratory medicine. Students investigate new areas of potential clinical importance. Highly variable selection of projects includes chemistry, coagulation, hematology, immunology, microbiology, virology, and computer applications. Research goals established by instructor in discussion with each student. Prerequisite: permission of instructor. Offered: AWSpS.

LAB M 596 Clinical Chemistry Seminar (2) *Raisys* Conferences on research and development in clinical chemistry. For postdoctoral students in clinical chemistry and graduate students. Prerequisite: permission of instructor. Offered: AWSp.

LAB M 601 Internship (3-9, max. 9) Credit/no credit only. Prerequisite: graduate standing in laboratory medicine. Offered: AWSpS.

LAB M 680P Clinical Laboratory Testing: Methods and Interpretation (*) *Dettler* Provides the third- and fourth-year medical student with the opportunity to evaluate clinical laboratory data in the clinical laboratory setting. One-on-one teaching using case material and actual clinical samples. Offered: AWSpS.

LAB M 700 Master's Thesis (*) Credit/no credit only. Offered: AWSpS.

Medical Education

The objectives of the Department of Medical Education are to discover, disseminate, and apply knowledge of educational theory and practice in medical education. Research seeks to increase the basic fund of knowledge in educational theory and practice in medical education. Through teaching, the educational knowledge base is transmitted to the faculty, fellows, residents, and students. Through scholarly research, teaching, and service, educational expertise is used to enhance the quality of academic programs in medicine and the health sciences.

Faculty

Chair

Charles W. Dohner

Professors

Dohner, Charles W. * 1967; PhD, 1966, Ohio State University; program evaluation, administration, faculty development.

Irby, David M. * 1972; PhD, 1977, University of Washington; the evaluation and improvement of clinical teaching in medicine.

Scott, Craig S. 1979; MEd, 1970, California State University, Sacramento; PhD, 1973, University of Iowa; faculty course evaluation, medical education outcomes, health promotion.

Associate Professor

Carlina, Jan D. 1977; MEd, 1976, PhD, 1979, University of Washington; clinical evaluation, program evaluation.

Assistant Professor

Smith, Curtis Scott 1989, (Adjunct); MD, 1980, University of Washington; general internal medicine.

Senior Lecturers

Ballweg, Ruth A. 1981; BS, 1969, Southern Oregon State College; women's health issues.

Stoll, Henry 1978; BA, 1971, Brown University; physician assistant education and professional issues, curriculum development.

Lecturers

Asplin, Norma J. 1992; MS, 1978, University of Colorado (Denver); physician assistant education.

Flynn, Barbara G. 1994; BA, 1977, Seattle Pacific University; physician assistant education.

Gianola, Fred J. 1987; PA-C, 1973, University of Washington; physician assistant education.

Harder, Ellen J. 1988; PA-C, 1978, University of Washington; outpatient clinical problems, orthopedics and administration.

Landel, Grace P. 1990; BA, 1978, University of California (Santa Cruz); physician assistant education.

MacLaren, Carol F. 1989; MS, 1980, PhD, 1985, University of Pennsylvania; educational research.

Plummer, William T. 1992; BS, 1974, University of Nebraska; physician assistant education.

Schaad, Douglas C. 1975; MEd, 1974, PhD, 1986, University of Washington; computer assisted instruction, measurement, evaluation.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Medical Education

MEDED 499 Undergraduate Research (*, max. 12) *Scott* Investigative research or readings in medical education; topics include clinical reasoning, curriculum development, evaluation, use of computers in medical education, and educational research in medical settings. Credit/no credit only. Prerequisite: permission of instructor.

MEDED 510 Topics in Medical Education Research (2-3) *Fuller* Selected research topics in medical education. Development of skills in critical analysis and production of original research. Optional: 1 additional credit for seminar focusing on application

of issues in education practice. Credit/no credit only. Offered: Sp.

MEDED 511 Current Issues in Medical Education (2) *Dohner, Irby* Addresses current issues in medical education in the context of historic and contemporary developments. Possible topics include curriculum teaching and learning, clinical knowledge and reasoning, assessment, and certification. Offered: A.

MEDED 512 Leadership in Academic Medicine (1) *Dohner, Irby* Explores the theoretical and practical aspects of leadership in academic medicine. Offered: S.

MEDED 520 Teaching Methods in Medical Education (2) *Irby* Empirical and theoretical merits of different teaching methods as applied to medical education. Structuring and leading group discussions, using questions, organizing and delivering lectures, identifying styles of clinical supervision, providing constructive feedback, and presenting effective clinical demonstrations. Offered: W.

MEDED 521 Evaluation of Learning in the Health Sciences (2) *Carlina* Basic issues and methods for evaluation of learning: cognitive performance, psychomotor skills, and reasoning abilities in classroom, laboratory, and clinical settings. Practical applications of instruments such as multiple-choice questions, essays, oral examinations, checklists, rating scales, simulations, and patient management problems. Recommended: 520. Offered: Sp.

MEDED 522 Research in Medical Education (2) *Scott* Individualized, problem-based overviews of research methods and research design pertinent to research and scholarship in medical education. Development and sequencing of research projects from conceptualization through literature review, including proposal development, project implementation, data management, analysis, and write-up. Accessing and critical reading of related literature stressed. Offered: A.

MEDED 530 Medical Informatics (3) *Brinkley, Fine, Fuller, Kalet, Kwan-Gelt, Schaad, Tarczy-Hornoch* Overview of medical informatics concepts and theories, historical evolution, current and future research directions in the context of information flow in health care settings. Offered: Sp.

MEDED 599 Independent Study or Research (*, max. 6) Credit/no credit only.

MEDEX Northwest

MEDEX 451 Anatomy and Physiology for the MEDEX Practitioner (6) *Blomstrand* Anatomy and physiology of the following organ systems: HEENT, respiratory, cardiovascular, gastrointestinal, reproductive, renal, musculoskeletal, and neurologic. Required for entering students to the MEDEX program who have not satisfied program prerequisites in anatomy and physiology. Prerequisite: admission to the MEDEX program. Offered: S.

MEDEX 452 Basic Clinical Pathology for the MEDEX Practitioner (6) *Stoll* Basic pathological and pathophysiological concepts of diseases commonly encountered in primary-care practice. Pathophysiology studied per organ system. Prerequisite: admission to MEDEX program. Offered: A.

MEDEX 453 Basic Clinical Skills for the MEDEX Practitioner (6) *Landel* Provides the student with mastery of a screening history and physical examination and thoroughness in data-collection skills. Branching examinations of major organ systems and medical record-keeping and verbal presentation skills by the problem-oriented method are taught. Prerequisite: admission to the MEDEX program. Offered: A.

MEDEX 454 Adult Medicine I (7) *Stoll* Problem-oriented approach to the diagnosis and management of common primary care conditions. Introduction to

relevant laboratory and radiological procedures. Organ system approach covers HEENT, respiratory, cardiovascular, gastrointestinal, and dermatologic systems. Prerequisites: admission to MEDEX program. Offered: W.

MEDEX 455 Adult Medicine II (7) *Stoll* Continuation of 454. Introduction to relevant laboratory and radiological procedures. Organ system approach covers endocrine, renal, reproductive, hematologic, musculoskeletal, and neurological systems. Prerequisite: admission to MEDEX program. Offered: Sp.

MEDEX 456 Maternal and Child Health for the MEDEX Practitioner I (3) *Asplin* Designed to acquaint students with principles of prenatal care and primary-care pediatrics. Prenatal care, labor and delivery, newborn exam, developmental screening, growth and development. Prerequisite: admission to MEDEX program. Offered: W.

MEDEX 457 Behavioral Science Skills for the MEDEX Practitioner I (3) *Gianola, Lurie* Process skills and interpersonal skills needed for primary-care practice, assessment skills needed for the diagnosis of emotional problems, and management skills used in primary-care practice to deal with these problems. Prerequisite: admission to the MEDEX program. Offered: A.

MEDEX 458 Behavioral Science Skills for the MEDEX Practitioner II (3) *Gianola, Lurie* In-depth coverage of common emotional problems seen in primary care. Topics include crisis intervention, child abuse, death and dying, life planning, behavioral modification, and family therapy techniques. Prerequisite: admission to MEDEX program. Offered: W.

MEDEX 459 Behavioral Science Skills for MEDEX Practitioner III (3) *Gianola, Lurie* In-depth approaches to assessment and management of specific primary-care problems, including posttraumatic stress disorders, AIDS, violent patient, relevance of male/female issues to primary care, and emotional and sexual needs of disabled persons. Advanced interviewing skills with videotaped feedback included. Prerequisite: admission to MEDEX program. Offered: Sp.

MEDEX 460 Principles of Patient Management for the MEDEX Practitioner I (3) *Reynolds* Systematic approach to patient management applicable to a primary-care setting. Majority of course is devoted to drug therapy and its administration. The other half includes health maintenance, risk factor identification, and nonpharmacological models of therapy. Prerequisite: admission to MEDEX program. Offered: W.

MEDEX 461 Principles of Patient Management for the MEDEX Practitioner II (3) *Reynolds* Continuation of 460. Prerequisite: admission to the MEDEX program. Offered: Sp.

MEDEX 462 Maternal and Child Health for the MEDEX Practitioner II (3) *Asplin* Continuation of 456. Emphasis on pediatric history taking and physical exam, and diagnosis and treatment of common pediatric problems. Prerequisite: admission to the MEDEX program. Offered: Sp.

MEDEX 463 Clinical Clerkships for the MEDEX Practitioner I (19) *Gianola, Gunter-Flynn* Full-time clinical clerkship spent in institution-based or specialty practice settings, such as occupational health, surgery, emergency medicine, psychiatry, or geriatrics. Prerequisite: admission to MEDEX Northwest Physician Assistant program. Offered: AWSpS.

MEDEX 465 Clinical Clerkships for the MEDEX Practitioner II (19) *Gianola, Gunter-Flynn* Continuation of clinical clerkships spent in institution-based or specialty practice settings, with emphasis on inpatient medicine. Prerequisite: admission to the MEDEX Northwest Physician Assistant program. Offered: AWSpS.

MEDEX 466 Family Practice Clerkship for the MEDEX Practitioner I (19) *Ballweg, Landel* Family practice under the supervision of physicians throughout the Pacific Northwest. Common primary-care problems. Students and preceptors are educated in the utilization and management of the physician assistant in practice. Students keep computerized records of patient encounters and complete a variety of written assignments. Prerequisite: admission to MEDEX program. Credit/no credit only. Offered: AWSpS.

MEDEX 467 Family Practice Clerkship for the MEDEX Practitioner II (19) *Ballweg, Landel* Further experience in primary-care practice with emphasis on independent patient management by the student supervised by family practitioners. Prerequisite: admission to MEDEX program. Credit/no credit only. Offered: AWSpS.

MEDEX 468 Emergency Medicine I for the MEDEX Practitioner (3) *Plummer* Approach to the diagnosis and management of common emergency conditions for primary care physician assistants. Topics include multiple trauma, chest trauma, abdominal trauma, shock, and cardiac emergencies. Prerequisite: admission to MEDEX program. Offered: W.

MEDEX 469 Emergency Medicine II for the MEDEX Practitioner (3) *Plummer* Approach to diagnosis and management of common emergency conditions for primary care physician assistant. Topics include poisonings and overdoses, environmental emergencies, thermal injuries, orthopedic emergencies, pediatric emergencies, and head trauma. Prerequisite: admission to MEDEX program. Offered: Sp.

MEDEX 499 Special Field Projects/Independent Study (1-12) Clinical clerkships and independent study activities for students enrolled in the MEDEX Northwest Physician Assistant Program. Prerequisite: permission of program director.

Medical History and Ethics

James C. Whorton, Graduate Program Coordinator

The Department of Medical History and Ethics offers a program of study leading to the Master of Arts degree in either medical history or medical ethics. An interdisciplinary Ph.D. option in philosophy and medical ethics is offered through the Department of Philosophy in the College of Arts and Sciences.

Undergraduate students may select a minor in medical history and ethics. Departmental courses for undergraduates are also included in several College Studies sequences, as well as in the Program in History of Science, Technology and Medicine offered through the Department of History in the College of Arts and Sciences.

Minor

Minor Requirements: 25 credits of medical history and ethics and related courses, to include MHE 401, 411, 440 and an additional 12 credits selected from MHE 402, 419, 421, 422, 424, 474, 481, 483, 485, 497, 498, 499, 501; ANTH 375, 475, 476; ENGL 364; PHIL 345. Minimum grade of 2.0 required in each course presented for the minor.

Graduate Program

Special Requirements

Applicants for the Master of Arts program must meet requirements for admission to the Graduate School and present a background in either history or philosophy. Additional information concerning acceptable preparation may be obtained by contacting the graduate program coordinator.

Aspirants to the Master of Arts degree are expected to possess proficiency in historical and/or philosophical methods and familiarity with the biomedical sciences. Department requirements include completion of a series of approved upper-division and graduate courses in supporting fields of study; demonstration of reading knowledge in one foreign language for medical history majors; satisfactory completion of a general examination (written and oral); and submission of an acceptable thesis with oral defense of the thesis. A minimum of three full-time quarters of residency is required, and it is expected that the entire program will be completed within four to six quarters. Current areas of specialization for master's program students include history of medicine; history of health, exercise and sports medicine; and medical ethics.

Admission to the interdisciplinary Ph.D. program option in philosophy and medical ethics is normally subsequent to completion of the Master of Arts degree in medical ethics or philosophy at the UW.

Correspondence and Information

Graduate Program Coordinator
Department of Medical History and Ethics, Box 357120

Faculty

Chair

Albert R. Jonsen

Professors

Benson, Keith R. * 1981; MA, 1973, PhD, 1979, Oregon State University; history of modern American biology, marine biology, and evolutionary biology.

Berryman, Jack W. * 1975; MS, 1971, MA, 1974, University of Massachusetts; PhD, 1976, University of Maryland; history of exercise, sports medicine, and health behavior/philosophy.

Jonsen, Albert R. * 1987; MA, 1956, Gonzaga University; PhD, 1967, Yale University; philosophical, historical values affecting practice and delivery of health care.

Odegaard, Charles E. 1979, (Emeritus); MA, 1933, PhD, 1937, Harvard University; history of medical education.

Whorton, James C. * 1970; PhD, 1969, University of Wisconsin; history of medicine, public health, pharmacy and alternative healing.

Associate Professors

Jecker, Nancy A. S. * 1982; MA, 1982, Stanford University; MA, 1984, PhD, 1986, University of Washington; philosophical and ethical aspects of health care delivery and policy.

Pearlman, Robert A. * 1981, (Adjunct); MD, 1975, Boston University; gerontology.

Sullivan, Mark D. 1985, (Adjunct); PhD, 1982, MD, 1984, Vanderbilt University.

Assistant Professors

Braddock, Clarence H. 1993, (Adjunct); MD, 1981, University of Chicago; internal medicine, critical care and public ethics.

Diekema, Douglas S. 1993, (Adjunct); MD, 1985, University of North Carolina; MPH, 1993, University of Washington; pediatric emergency medicine.

Durly, Sharon J. 1995, (Research); PhD, 1990, University of Toronto (Canada); ethical aspects of genetic testing, counseling and research.

Senior Lecturer

McCormick, Thomas R. • 1974; BDiv, 1960; Drake University; DMin, 1976, Southern Methodist University; biomedical ethics, particularly relating to neonatology, and problems related to death and dying.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

MHE 401 History of Modern Medicine (5) I&S Whorton Analysis of the evolution of medical theory and practice in European and American society from antiquity to the present. Emphasis on the development of medicine since the Renaissance. medical background not required. Prerequisites: courses in sciences and/or history.

MHE 402 Normative Ethical Theory (5) I&S Jecker Development of moral thought from Hobbes through Nietzsche, with particular emphasis on the ethical writings of David Hume, Immanuel Kant, and Jeremy Bentham. Recommended: one course in ethics.

MHE 404 Metaethical Theory (5) I&S Jecker Study of major ethical writings in the twentieth century, with principal emphasis on the Anglo-American tradition. Recommended: one course in philosophy.

MHE 411 Introduction to Bioethics (3) Basic concepts, principles, and methods of analysis, with application to some major issues in the field of bioethics. Case studies utilized to illustrate nature of questions arising in bioethics and to provide students with opportunity to develop skills in ethical analysis.

MHE 417 Disease in History (3) Whorton Study of Western civilization's experience with epidemic disease, the growth of understanding of the causes of disease, the formation of a philosophy of prevention, and the development of programs to protect the public health. Emphasis on the last two centuries. Medical background not required.

MHE 419 Science in Civilization: Antiquity to the Scientific Revolution (6) I&S Benson From pre-classical antiquity to the end of the Middle Ages, stressing the growth of scientific ideas, the cultural context in which they take shape, and their relationship to other movements of thought in the history of civilization. Prerequisite: graduate standing.

MHE 421 Science in Civilization: Science in Modern Society (5) I&S Benson Growth of modern science from the Renaissance to the nineteenth century, emphasizing the scientific revolution of the seventeenth century. Development of methodology and the emergence of new fields of interest and new modes of thought. Prerequisite: graduate standing.

MHE 422 History of Evolution Theory (3) I&S Benson Development of evolution theory from its early-nineteenth-century roots through the work of Charles Darwin. Impact of evolution theory on society and the formulation of the theory in the twentieth century.

MHE 424 Modern Biology in Historical Perspective (5) I&S Benson Two diverse traditions of biology, natural history, and physiology, in their nineteenth-century development and their subsequent merging after Darwin's evolution theory. Emergence of specialty areas in biology after the beginning of the twentieth century. Prerequisite: upper-class standing or permission of instructor.

MHE 440 Philosophy of Medicine (5) I&S Jecker Familiarizes students with central issues in the philosophy of medicine. Focuses on the nature of medical knowledge, the connection between theory and observation, the meaning of medical concepts, and the relationship between theories and the world. Prerequisites: some prior course work in philosophy, the history

of science, or the history of medicine. Offered: jointly with PHIL 459.

MHE 474 Justice in Health Care (5) I&S Jecker Examination of the ethical problem of allocating scarce medical resources. Emphasis on fundamental principles of justice that support alternative health policies. Recommended: some previous background in philosophy or medical ethics. Offered: jointly with PHIL 411.

MHE 481 The Pursuit of Health in American Society (5) I&S Berryman, Whorton Examination of the development of concern for personal health over the past two centuries, and of the evolution of philosophies and practices of health promotion. Emphasis on the influence of both medicine and popular culture on shaping of attitudes towards diet, exercise, dress, sex, and other health behavior.

MHE 483 The Rise and Development of Sports Medicine (3) I&S Berryman Evolution of medical thought related to exercise for good health, training for sport participation, and treatment of sport-related injuries. Begins with ancient period, concludes with present. Development of specialization in sports medicine, sport team physicians, preventive medicine, concepts of fitness and wellness as related to exercise prescription, and sports medicine clinics.

MHE 485 Concepts of the Body in Nineteenth- and Twentieth-Century America (3) I&S Berryman Investigation of ideas relating to corporeal self in nineteenth- and twentieth-century America. Evolution of physical ideals of manliness/femininity, how ideals related to surrounding culture, how different bodily activities developed to realize ideals. Athleticism, physiognomy, beauty contests, body building, decorations, cosmetics, anthropometry, artificial parts.

MHE 497 Medical History and Ethics Special Electives (*)

MHE 498 Undergraduate Thesis (*)

MHE 499 Undergraduate Research (*, max. 5) Investigative work in history of the biomedical sciences.

MHE 500 Seminar in Research Methods (*, max. 6) Emphasis is placed on bibliography and utilization of bibliographic sources. Practice in techniques of organizing and writing history of medicine and ethics. Prerequisite: permission of instructor.

MHE 501 Alternative Approaches to Healing (2) Whorton Philosophies and practices of the major alternative approaches to healing. Historical characterization of alternative medicine accompanied by presentations by practitioners of chiropractic, naturopathic, homeopathic, and traditional Chinese medicine. Recommended: enrollment in medical or other health professional school.

MHE 510 Topics in Medical History and Ethics (*, max. 6) Detailed study of topics in medical history and ethics through lectures, seminars, and discussion. Open to majors and graduate students in medicine, the arts and sciences, and others with appropriate background and interest. Prerequisite: permission of instructor.

MHE 511P Medical Ethics (1) Ethics course designed especially for first- and second-year medical students. Study of ethical problems arising in clinical setting of medicine, introducing students to philosophical analysis and argument in practical contexts. Seminar-discussion format with readings from contemporary authors.

MHE 512P The Human Face of Medicine (2) McCormick Foundation of human values undergirding medical practice. Images of physician—motivations for medicine; empathy versus detachment in doctor-patient relationship; health for the health-professional—the art of coping; limits of power—when medicine fails to cure; uses/abuses of technology;

physician's role in public health issues; the healing process.

MHE 513P Ethical Responsibilities of Medical Practice (2) Provides intensive and practical guidance about management of principal ethical and legal problems that arise in clinical practice: informed consent, confidentiality, decisions regarding life-support, advance directives and surrogate decision-makers, duty to care for indigent and risky patients. Offered on half days over two weeks.

MHE 520 Seminar in the History and Philosophy of Medicine (3) Origins and philosophical foundations of medical sciences. Critical analysis of processes of evaluation and explanation in biomedical sciences. Consideration of evolution and nature of modern biomedical investigation; concepts of life/death, health/disease; philosophical dimensions of clinical medicine. Open to majors, medical students, arts and sciences graduate students, and others.

MHE 521 The Ethical Challenges of Modern Medicine (3) McCormick Case-study approach to contemporary ethical issues in medicine, utilizing techniques of ethical analysis and argument in examining actual cases arising in our pluralistic culture, where values are often in conflict. Open to graduate and professional students and others with appropriate background.

MHE 522 Ethical Problems Surrounding Death (3) McCormick Issues arising in care and treatment of dying patients and their families, including truthful disclosure, use of life-supports, "euthanasia," coping with death and grief. Intersection of patient and professional values related to care in terminal phase of illness. Open to graduate and professional students and others with appropriate background.

MHE 523 Biomedical Ethics (3) McCormick Selected topics in medical ethics emphasizing methods of ethical reasoning about moral dilemmas and contributions of philosophical theories and principles to practical problems of medicine. Students provided with opportunities to test their value assumptions and analytical skills. Open to graduate and professional students and others with appropriate background.

MHE 525 Seminar in the History and Philosophy of Biology (3) Tailored to individual interests in certain areas of the history and philosophy of biology. Open to majors and graduate students in medicine, the arts and sciences, and others with appropriate background and interest.

MHE 530 Seminar in the History of American Medicine (3) Selected topics in the development of medicine and public health in the United States. Open to majors and graduate students in medicine and the arts and sciences and to others with appropriate background and interest.

MHE 535 Medical Ethics and Jurisprudence (3) Jonsen Relationship between bioethics and law. Review of basic concepts of both disciplines; their theoretical and practical connections. Analysis of principal legal cases and statutes illustrating such issues as informed consent to treatment, foregoing life support, research with human subjects, confidentiality, allocation of health care resources. For graduate and professional students.

MHE 540 Seminar in the History of Health and Physical Exercise (3) Selected topics in the development of medical thought as it relates to exercise, sport, and overall well-being. Open to majors and graduate students in medicine, the arts and sciences, and others with appropriate background and interest. Prerequisite: permission of instructor.

MHE 545 Seminar in Clinical Ethics (3) Jonsen Review of various approaches to analyzing ethical aspects of clinical decisions. Relationship between ethical theories and practical problems. Analysis of important current cases in medical ethics to demon-

strate a systematic method of clinical-ethical analysis. Open only to graduate and professional students.

MHE 595- Clinical Ethics Practicum (4-) Students spend one week on each of four clinical services at University of Washington teaching hospitals. Under direction of clinicians, observe patient care activities, participate in care conferences, become familiar with relevant medical and ethical literature. For majors only.

MHE 600 Independent Study or Research (*)

MHE 700 Master's Thesis (*)

Medicine

RR512 University of Washington Medical Center

Active programs in teaching, research, and patient care are carried on at the University of Washington Medical Center, Seattle Veterans Affairs Medical Center, Harborview Medical Center, Pacific Medical Center, the Puget Sound Blood Center, the Northwest Kidney Center, and the Fred Hutchinson Cancer Research Center. Major affiliations for clinical teaching also exist with Providence Medical Center and Swedish Hospital Medical Center. There are many additional affiliations with community hospitals in Seattle, the state of Washington, and the WAMI region. Medical students, interns, medical residents, and postdoctoral research fellows rotate through these various hospitals and participate in the learning experiences offered at each.

Faculty

Chair

Paul G. Ramsey

Professors

Aagaard, George N. * 1954, (Emeritus); MD, 1937, University of Minnesota; clinical pharmacology.

Abkowitz, Janis L. 1980; MD, 1977, Harvard University; hematology.

Abrass, Christine K. 1984; MD, 1973, Case Western Reserve University; nephrology.

Abrass, Itamar B. 1983; MD, 1966, University of California (San Francisco); gerontology.

Albers, John J. * 1971, (Research); MS, 1967, PhD, 1969, University of Illinois; lipoprotein metabolism and pathophysiology.

Albert, Richard K. 1976; MD, 1971, University of Colorado (Denver); respiratory diseases.

Appelbaum, Frederick R. 1978; MD, 1972, Tufts University; oncology.

Austin, Melissa A. * 1988; PhD, 1985, University of California (Berkeley); genetic epidemiology of lipoproteins, coronary heart disease and cancer.

Bardy, Gust H. 1983; MD, 1977, Northwestern University; cardiology.

Baskin, Denis G. * 1979, (Research); PhD, 1969, University of California (Berkeley); histology, cytochemistry, neuroendocrinology.

Beeson, Paul B. 1974, (Emeritus); MD, 1933, McGill University (Canada).

Bishop, Michael J. 1979, (Adjunct); MD, 1974, University of California (San Diego).

Blagg, Christopher R. 1966; MD, 1954, MBChB, 1954, University of Leeds (UK); nephrology.

Bomsztyk, Karol 1983; MD, 1977, University of Rochester; nephrology.

Bornstein, Paul * 1967; MD, 1958, New York University; extracellular matrix.

Bremner, William J. 1980; MD, 1969, University of Washington; PhD, 1977, Monash University (Australia); endocrinology.

Brown, B. Greg 1981; MD, 1969, PhD, 1969, Johns Hopkins University; cardiology.

Bruce, Robert A. 1950, (Emeritus); MD, 1943, University of Rochester; cardiology.

Brunzell, John D. * 1969; MD, 1963, University of Washington; nutritional and metabolic aspects of lipoproteins and diabetes.

Buchner, David M. * 1984, (Adjunct); MD, 1977, University of Kansas; MPH, 1984, University of Washington; geriatric health promotion.

Buckner, Clarence D. 1968; MD, 1961, University of Michigan; oncology.

Byers, Peter H. * 1976; MD, 1969, Case Western Reserve University; extracellular matrix synthesis, genetic disorders of collagen metabolism, secretion.

Caldwell, James H. 1978; MD, 1970, University of Missouri; cardiology.

Carithers, Robert L. 1990; MD, 1969, University of Pennsylvania; gastroenterology/hepatology.

Chait, Alan * 1977; MBChB, 1967, MD, 1974, University of Capetown (South Africa); clinical nutrition with special emphasis on lipid metabolism.

Chatrian, Gian E. 1959, (Emeritus); MD, 1951, University of Naples (Italy); electroencephalography and clinical neurophysiology.

Cheever, Martin A. 1975; MD, 1970, University of Michigan; oncology.

Chesnut, Charles * 1974; MD, 1966, University of Florida; nuclear medicine.

Cobb, Leonard A. 1957, (Emeritus); MD, 1952, University of Minnesota; cardiology.

Collins, Steven J. 1980; MD, 1973, Columbia University; oncology.

Copass, Michael K. 1973; MD, 1964, MA, 1964, Northwestern University; neurology/emergency services.

Corey, Lawrence * 1977, (Adjunct); MD, 1971, University of Michigan; laboratory medicine; diagnosis, therapy, and pathogenesis of viral infections, AIDS virus.

Counts, Richard B. 1973; MD, 1967, Washington University; hematology.

Couser, William G. 1982; MD, 1965, Harvard University; nephrology.

Cowan, Marie J. * 1977, (Adjunct); MS, 1972, PhD, 1979, University of Washington; estimation of infarct size by electrocardiography, sudden cardiac death, physiological nursing.

Cummins, Richard 1977; MD, 1972, Case Western Reserve University; MPH, 1977, University of Washington; emergency medicine.

Dale, David C. 1974; MD, 1968, Harvard University; internal medicine.

Dale-Crunk, Beverly A. * 1972, (Adjunct); PhD, 1968, University of Michigan; keratin biochemistry.

Deeb, Samir S. * 1983, (Research); PhD, 1964, University of Illinois; genetic factors predisposing to hyperlipidemia and coronary artery disease.

Deeg, H. Joachim 1994; DrMed, 1972, University of Bonn (Germany); oncology.

Dennis, Melvin B. * 1971, (Adjunct); DVM, 1961, Washington State University; comparative medicine, including animal models and experimental surgery.

Deyo, Richard A. * 1986; MD, 1975, Pennsylvania State University; health status measurement and evaluation of common medical practices.

Dodge, Harold T. 1969, (Emeritus); MD, 1948, Harvard University; cardiology.

Dorsa, Daniel M. * 1981, (Adjunct); PhD, 1977, University of California (Davis); neuropharmacology, neurochemistry.

Eisenberg, Mickey * 1975; MD, 1971, Case Western Reserve University; PhD, 1978, University of Washington; sudden cardiac arrest and acute myocardial infarction.

Eliel, Leonard P. 1974, (Emeritus); MD, 1940, Harvard University; metabolism and endocrinology.

Ensinck, John W. * 1961; MC/CM, 1956, McGill University (Canada); the role of GI hormones in fuel homeostasis.

Fefer, Alexander 1968; MD, 1964, Stanford University; oncology.

Fialkow, Phillip J. * 1965; MD, 1960, Tufts University; medical genetics.

Fields, Stanley 1995; MA, 1978, PhD, 1981, Cambridge University (UK); molecular genetics.

Figley, Melvin M. 1958, (Emeritus); MD, 1944, Harvard University; thoracic and pulmonary radiology.

Finch, Clement A. 1949, (Emeritus); MD, 1941, University of Rochester; hematology.

Fujimoto, Wilfred Y. * 1970; MD, 1965, Johns Hopkins University; metabolism, endocrinology, nutrition.

Furlong, Clement E. * 1977, (Research); PhD, 1968, University of California (Davis); human biochemical genetics in biochemistry of membrane transport systems.

Gartler, Stanley M. * 1957, (Emeritus); PhD, 1952, University of California (Berkeley); mammalian somatic cell genetics with emphasis on the mechanism of x-chromosome inactivation.

Gilliland, Bruce C. * 1968; MD, 1960, Northwestern University; rheumatology/immunology.

Glomset, John A. * 1960; MD, 1960, University of Uppsala (Sweden); membrane structure and function.

Goodner, Charles J. * 1962, (Emeritus); MD, 1955, University of Utah; metabolism and endocrinology.

Graham, Michael M. * 1980, (Adjunct); PhD, 1973, University of California (Berkeley); MD, 1976, University of California (San Francisco); positron emission tomography, nuclear medicine.

Greenberg, Philip D. * 1978; MD, 1971, State University of New York (Downstate); molecular, cellular, viral, and tumor immunology.

Greene, H. Leon 1979; MD, 1969, Johns Hopkins University; cardiology.

Haggitt, Rodger C. 1984, (Adjunct); MD, 1967, University of Tennessee; anatomic pathology, gastrointestinal pathology.

Handsfield, Hunter 1979; MD, 1968, Columbia University; infectious diseases.

Hansen, John A. 1977; MD, 1970, Stanford University; oncology.

Harlan, John M. 1978; MD, 1973, University of Chicago; hematology, leukocyte-endothelial interaction.

Henderson, Maureen M. * 1975; MBBS, 1949, DPH, 1956, University of Durham (UK); epidemiology of chronic diseases.

Henderson, William R. 1978; MD, 1973, University of California (San Francisco); allergy and infectious disease.

Hildebrandt, Jacob * 1966; PhD, 1966, University of Washington; respiratory physiology.

Hirschmann, Jan V. 1976; MD, 1970, University of Washington; internal medicine.

- Hlastala, Michael P. * 1972; PhD, 1969, State University of New York (Buffalo); respiratory physiology, inert gas analysis of respiratory function.
- Holmes, King K. * 1969; MD, 1963, Cornell University; PhD, 1967, University of Hawaii; clinical epidemiology and pathogenesis of infectious diseases.
- Hood, Leroy E. * 1992, (Adjunct); PhD, 1968, California Institute of Technology; molecular immunology, large-scale DNA mapping and sequencing, molecular evolution.
- Hudson, Leonard D. 1973; MD, 1964, University of Washington; respiratory diseases.
- Jonsen, Albert R. * 1987, (Adjunct); MA, 1956, Gonzaga University; PhD, 1967, Yale University; philosophical, historical values affecting practice and delivery of health care.
- Kaushansky, Kenneth 1986; MD, 1979, University of California (Los Angeles); hematology.
- Kennedy, J. Ward 1966; MD, 1959, University of Rochester; cardiology.
- King, Mary-Claire 1995; PhD, 1973, University of California (Berkeley); human genetics.
- Kirby, William M. M. 1949, (Emeritus); MD, 1940, Cornell University; infectious disease.
- Kiviat, Nancy C. 1979, (Adjunct); MA, 1970, MD, 1975, University of Washington; pathology, epidemiology and interrelationships between HIV, HPV, other STDs and malignancy.
- Klebanoff, Seymour * 1962; MD, 1951, University of Toronto (Canada); PhD, 1954, University of London (UK); infectious disease.
- Knopp, Robert H. * 1974; MD, 1964, Cornell University; metabolism and endocrinology.
- Koepsell, Thomas D. * 1979, (Adjunct); MD, 1972, Harvard University; MPH, 1979, University of Washington; chronic diseases, applying epidemiologic concepts to medical practice.
- Koerker, Donna J. * 1982; PhD, 1970, University of Michigan; endocrinology, intermediate metabolism of carbohydrates.
- Kreiss, Joan K. * 1984; MD, 1978, Washington University; MPH, 1984, University of California (Los Angeles); epidemiology of AIDS, particularly in Africa.
- Lakshminarayanan, S. 1975; MBBS, 1965, All-India Institute of Medical Science; pulmonary medicine.
- Larson, Eric B. * 1977; MD, 1973, Harvard University; internal medicine.
- Lee, Sum Ping 1985; MBBS, 1970, University of Hong Kong; PhD, 1978, University of Auckland (New Zealand); MD, 1982, University of Hong Kong; gastroenterology.
- Lemmark, Ake 1994; MD, 1970, PhD, 1971, University of Umea; metabolism and endocrinology.
- Livingston, Robert B. 1982; MD, 1967, University of Oklahoma; oncology.
- Logerfo Sr., James P. * 1974; MD, 1968, University of Rochester; MPH, 1974, University of Washington; quality-of-care assessment.
- Mannik, Mart * 1966; MD, 1959, Case Western Reserve University; rheumatology.
- Martin, Paul J. 1977; MD, 1974, University of Pennsylvania; oncology.
- Martin, Thomas R. 1980; MD, 1979, University of Pennsylvania; pulmonary medicine.
- Mayer, Jonathan D. * 1977, (Adjunct); PhD, 1977, University of Michigan; medical geography, clinical applications, philosophy.
- McArthur, James R. 1973; MD, 1956, Harvard University; hematology.
- McDonald, George B. 1973; MD, 1967, Washington University; gastroenterology.
- Monsen, Elaine R. * 1969, (Adjunct); MS, 1959, PhD, 1961, University of California (Berkeley); nutrition, dietetics.
- Motulsky, Arno G. * 1953, (Emeritus); MD, 1947, University of Illinois; medical genetics.
- Mullins, James I. 1994; PhD, 1978, University of Minnesota; cell biology and biochemistry.
- Naiman, Paul E. * 1971; MD, 1964, University of Washington; oncology.
- Nelp, Wil B. 1962, (Emeritus); MD, 1955, Johns Hopkins University; nuclear medicine.
- Odland, George F. 1955, (Emeritus); MD, 1946, Harvard University; dermatology.
- Olerud, John E. 1977; MD, 1971, University of Washington; dermatology.
- Olson, Maynard V. 1992; PhD, 1970, Stanford University; large-scale genome mapping and sequencing.
- Omerni, Gilbert S. * 1981; MD, 1965, Harvard University; PhD, 1972, University of Washington; genetic predisposition to environmental and occupational hazards.
- Pagon, Roberta A. 1975, (Adjunct); MD, 1972, Harvard University; medical genetics.
- Palmer, Jerry P. 1974; MD, 1970, State University of New York (Upstate); metabolism and endocrinology, diabetes.
- Papayannopoulou, Thalia 1974; MD, 1961, DMedSc, 1964, University of Athens (Greece); hematology.
- Paulsen, C. Alvin 1958, (Emeritus); MD, 1952, University of Oregon; metabolism and endocrinology.
- Pearlman, Alan S. 1978; MD, 1970, Harvard University; cardiology.
- Perine, Peter L. * 1981, (Adjunct); MD, 1966, University of Kansas; MPH, 1973, University of Washington; international health, sexually transmitted diseases.
- Perlmutter, Roger M. * 1984; MD, 1979, PhD, 1979, Washington University; molecular immunology and signal transduction in hematopoietic cells.
- Petersdorf, Robert G. 1994; MD, 1952, Yale University.
- Pierson, David John 1976; MD, 1969, Johns Hopkins University; respiratory diseases.
- Plorde, James J. * 1967; MD, 1959, University of Minnesota; infectious diseases, antibiotic-resistant nosocomial infections.
- Pope, Charles E. 1964, (Emeritus); MD, 1957, Case Western Reserve University; gastroenterology.
- Porte, Daniel Jr. 1965; MD, 1957, University of Chicago; metabolism and endocrinology.
- Preston, Thomas A. 1972; MD, 1962, University of Pennsylvania; cardiology.
- Price, Thomas H. 1975; MD, 1966, Johns Hopkins University; hematology.
- Probstfield, Jeffrey L. 1994; MD, 1967, University of Washington; cardiology.
- Ramsey, Paul G. 1980; MD, 1975, Harvard University; infectious diseases, internal medicine.
- Ritchie, James L. 1974; MD, 1967, Case Western Reserve University; cardiology.
- Robertson, H. Thomas 1973; MD, 1968, Harvard University; respiratory diseases.
- Root, Richard K. 1991; MD, 1963, Johns Hopkins University; infectious diseases.
- Rosen, Henry 1977; MD, 1972, University of Rochester; allergy and infectious diseases.
- Rosenstock, Linda * 1980; MD, 1977, Johns Hopkins University; occupational/general internal medicine.
- Roth, Gerald J. 1984; MD, 1967, Harvard University; hematology.
- Rowell, Loring B. * 1963, (Adjunct); PhD, 1962, University of Minnesota; regulation of blood flow, exercise physiology.
- Rubin, Cyrus E. 1954, (Emeritus); MD, 1945, Harvard University; gastroenterology.
- Saunders, David R. * 1965, (Emeritus); MD, 1957, McGill University (Canada); intestinal absorption, effect of drugs on GI mucosa.
- Schmer, Gottfried * 1969, (Adjunct); MD, 1956, University of Vienna (Austria); synthesis of artificial organs, molecular engineering of antitumor enzymes.
- Schuffler, Michael D. 1973; MD, 1966, University of Illinois; gastroenterology.
- Schwartz, Robert S. * 1982; MD, 1974, Ohio State University; internal medicine and geriatrics.
- Schwartz, Stephen Mark * 1974, (Adjunct); MD, 1967, Boston University; PhD, 1973, University of Washington; vascular biology, atherosclerosis, molecular basis of lineage, developmental biology, cell kinetics.
- Scribner, Belding H. 1951, (Emeritus); MD, 1945, Stanford University; MS, 1951, University of Minnesota; nephrology.
- Sherrard, Donald J. 1968; MD, 1960, University of Washington; nephrology.
- Simkin, Peter A. 1988; MD, 1961, University of Pennsylvania; rheumatology.
- Slichter, Sherrill J. 1968; MD, 1963, George Washington University; hematology.
- Smith, Charles B. 1991; MD, 1962, Harvard University; infectious diseases.
- Stamatoyannopoulos, George 1965; MD, 1958, DMedSc, 1960, University of Athens (Greece); medical genetics.
- Stamm, Walter E. * 1976; MD, 1971, Harvard University; infectious disease.
- Starkebaum, Gordon A. 1978; MD, 1970, Columbia University; rheumatology.
- Stevens, Dennis L. 1979; PhD, 1967, Montana State University; MD, 1971, University of Utah; infectious diseases.
- Stewart, Douglas 1971; MD, 1965, Harvard University; cardiology.
- Storb, Rainer F. 1968; MD, 1960, University of Freiburg (Germany); oncology.
- Stratton, John R. 1979; MD, 1973, Yale University; cardiology.
- Sullivan, Keith 1976; MD, 1971, Indiana University; oncology.
- Sybert, Virginia 1979, (Adjunct); MD, 1974, State University of New York (Buffalo); genetics and dermatology.
- Thomas, E. Donnell 1963, (Emeritus); MA, 1943, University of Texas (Austin); MD, 1946, Harvard University; oncology.
- Thompson, Arthur R. 1973; MD, 1966, PhD, 1972, University of Washington; hematology.
- Turck, Marvin 1964; MD, 1959, University of Illinois; infectious diseases.
- Van Citters, Robert L. * 1962; MD, 1953, University of Kansas; cardiovascular physiology.
- Verdugo, Pedro * 1974, (Adjunct); MD, 1965, State University of Chile; microrheology, biomechanics, polymer gel physics, laser spectroscopy, cell biology.
- Vestal, Robert E. 1977; MD, 1971, University of California (San Francisco); gerontology.
- Volwiler, Wade 1949, (Emeritus); MD, 1943, Harvard University; gastroenterology.
- Wallace, James F. 1968; MD, 1961, Washington University; internal medicine.

Weaver, W. Douglas 1979; MD, 1971, Tufts University; cardiology.

Woods, Stephen C. * 1972, (Adjunct); PhD, 1970, University of Washington; physiological psychology, regulatory behavior, conditioned drug effects.

Zager, Richard A. 1985; MD, 1969, Northwestern University; nephrology.

Associate Professors

Ahmad, Suhail 1976; MBBS, 1968, University of Allahabad (India); nephrology.

Aitken, Moira L. 1982; MBChB, 1978, University of Edinburgh (UK); respiratory disease.

Anasetti, Claudio 1983; MD, 1980, University of Perugia (Italy); oncology.

Andress, Dennis 1982; MD, 1978, University of Oklahoma; nephrology.

Barnhart, Scott * 1982; MD, 1979, George Washington University; occupationally related lung disease.

Beicher, Donald W. * 1976; MD, 1962, University of Pennsylvania; ambulatory medicine.

Benedetti, Jacqueline K. * 1980, (Adjunct); PhD, 1974, University of Washington; statistical methodology in infectious disease research, cancer clinical trials.

Bensinger, William I. 1977; MD, 1973, Northwestern University; oncology.

Berk, Bradford Charles 1994; MD, 1981, PhD, 1981, University of Rochester; cardiology.

Bowden, Raleigh A. 1983; MD, 1978, University of Washington; hematology/oncology.

Boyko, Edward J. * 1989; MD, 1979, University of Pittsburgh; epidemiology of inflammatory bowel disease and non-insulin-dependent diabetes mellitus.

Broudy, Virginia C. 1985; MD, 1980, University of California (San Francisco); hematology.

Buchwald, Dedra S. 1987; MD, 1981, University of California (San Diego); internal medicine.

Burke, Wylie 1981; PhD, 1974, MD, 1978, University of Washington; internal medicine.

Charan, Nirmal B. 1978; MBBS, 1968, Christian Medical College of Ludhiana; respiratory disease.

Childs, Marian T. * 1968, (Emeritus); PhD, 1950, University of California (Berkeley); nutrition.

Clark, Joan G. 1985; MD, 1974, Washington University; pulmonary and respiratory disease.

Collier, Ann C. 1982; MD, 1978, Dartmouth College; infectious diseases.

Comess, Keith A. 1992; MD, 1979, University of Arizona; cardiology.

Coombs, Robert W. * 1988; PhD, 1977, MD, 1981, Dalhousie University (Canada); diagnosis and pathogenesis of HIV infection.

Crawford, Stephen W. 1982; MD, 1978, St Louis University; respiratory disease.

Culver, Bruce H. 1973; MD, 1969, University of Washington; respiratory diseases.

Cusack, Barry J. 1982; MD, 1980, University College of Dublin (Ireland); gerontology.

Daniell, William E. * 1984, (Adjunct); MD, 1979, Tufts University; MPH, 1986, University of Washington; health effects of occupational chemical exposures, multiple chemical sensitivity syndrome.

Davidson, Robert C. 1968, (Emeritus); MD, 1953, University of Washington; nephrology.

Davis, Connie 1991; MD, 1980, University of Washington; nephrology.

Doney, Kristine 1975; MD, 1972, University of Michigan; hematology/oncology.

Dugowson, Carin E. 1979; MD, 1976, University of Illinois; MPH, 1986, University of Washington; rheumatology.

Farrow, James A. 1979, (Adjunct); MD, 1973, Baylor University; adolescent medicine.

Fihn, Stephan * 1979; MD, 1977, St Louis University; MPH, 1981, University of Washington; internal medicine.

Fleckman, Philip H. 1982; MD, 1973, Washington University; dermatology.

Fleet, Wendell P. 1971; MD, 1965, Creighton University; internal medicine.

Francis, Julie S. 1989, (Adjunct); MD, 1984, University of Washington; dermatology.

Gardner, Gregory C. 1989; MD, 1984, Baylor University; rheumatology.

Geballe, Adam Philip 1988; MD, 1978, Duke University; virology.

Goldberg, Harold I. 1986; MD, 1977, Stanford University; internal medicine.

Griep, Robert J. 1967; MD, 1958, University of Texas (Galveston); internal medicine/radiology.

Hammond, William P. 1978; MD, 1972, Tufts University; hematology.

Hickstein, Dennis D. 1984; MD, 1978, University of Nebraska; hematology.

Hirsch, Irl B. 1990; MD, 1984, University of Missouri; metabolism and endocrinology/diabetes.

Hooton, Thomas M. 1982; MD, 1973, University of Texas (Dallas); internal medicine.

Johnson, Richard J. 1986; MD, 1979, University of Minnesota; nephrology.

Kahn, Steven Emanuel 1986; MBChB, 1978, University of Capetown (South Africa); metabolism and endocrinology.

Kavanagh, Terrance J. * 1985, (Adjunct Research); MS, 1980, PhD, 1985, Michigan State University; free radical toxicology, glutathione metabolism, toxicology and aging.

Kimball, Ann M. 1993, (Adjunct); MD, 1976, MPH, 1981, University of Washington; maternal and child health, HIV/AIDS, international health.

Kimmey, Michael 1982; MD, 1979, Washington University; gastroenterology/endoscopy.

Kudenchuk, Peter J. 1986; MD, 1979, University of Washington; cardiology.

Lehmann, Kenneth G. 1990; MD, 1979, University of California (San Diego); cardiology.

Levine, Douglas S. 1985; MD, 1979, University of Massachusetts; gastroenterology.

Lilly, Michael B. 1989; MD, 1975, Loma Linda University; oncology.

Lindner, Armando 1971; MD, 1964, University of Buenos Aires (Argentina); nephrology.

Linker, David T. 1993; MD, 1976, Stanford University; cardiology.

Lipkin, Edward W. * 1981; PhD, 1976, MD, 1978, Case Western Reserve University; mineral metabolism, nutrition support, non-human primate physiology.

Lipsky, Benjamin A. 1977; MD, 1973, Cornell University; internal medicine.

Madtes, David K. 1994; MD, 1979, University of Pittsburgh; pulmonary and critical care medicine.

Martin, Gary V. 1984; MD, 1980, University of Arizona; cardiology.

Matsumoto, Alvin M. 1979; MD, 1975, University of Washington; metabolism and endocrinology.

McMullen, W. Russell 1981; MD, 1978, University of Cincinnati; internal medicine, emergency medicine.

Miller, Richard A. 1983; MD, 1977, Harvard University; infectious diseases.

Miller, Samuel I. 1995; MD, 1979, Baylor University; molecular pathogenesis of bacterial diseases.

Nelson, Judith Lee 1981; MD, 1977, University of California (Davis); rheumatology.

Nguyen, Toan D. 1994; MD, 1978, University of Chicago; gastroenterology.

Nielson, Christopher P. 1983; MD, 1978, University of California (Los Angeles); gerontology and geriatric medicine.

Ott, Ralph, Susan M. 1980; MD, 1974, University of Washington; nephrology.

Otto, Catherine M. 1984; MD, 1979, University of Washington; cardiology.

Pauw, Douglas 1988; MD, 1979, University of Washington; general internal medicine.

Pearlman, Robert A. * 1981; MD, 1975, Boston University; gerontology.

Piepkorn, Michael W. 1991; MD, 1973, University of Minnesota; PhD, 1980, University of Washington; dermatology.

Press, Oliver W. * 1982; PhD, 1977, MD, 1979, University of Washington; treatment of hematologic malignancies with monoclonal antibody immunoconjugates.

Psaty, Bruce M. * 1984; PhD, 1979, MD, 1981, Indiana University; cardiovascular disease, coronary heart disease, hypertension, and pharmacoepidemiology.

Quinn, Lebris S. * 1980, (Research); PhD, 1982, University of Washington; control of muscle precursor cell proliferation and differentiation; muscle growth.

Raghu, Ganesh 1981; MD, 1974, University of Mysore (India); respiratory disease.

Ralph, David D. 1979; MD, 1972, Stanford University; respiratory diseases.

Raskind, Wendy H. 1981; PhD, 1977, MD, 1978, University of Washington; medical genetics.

Raugi, Gregory J. 1980; MD, 1975, PhD, 1975, Duke University; dermatology.

Reid, Brian J. 1975; PhD, 1975, MD, 1980, University of Washington; gastroenterology.

Riddell, Stanley R. 1985; MD, 1979, University of Manitoba (Canada); oncology.

Rowley, Scott D. 1994; MD, 1978, University of Massachusetts; oncology.

Sayers, Merlin H. 1977; MBChB, 1968, PhD, 1978, University of Witwatersrand (South Africa); hematology.

Schmidt, Rodney 1984, (Adjunct); MD, 1984, PhD, 1984, University of Washington; surgical pathology, pulmonary pathology, sarcomas, image analysis, electron microscopy.

Schoene, Robert B. 1977; MD, 1972, Columbia University; respiratory diseases.

Schubach, William H. 1994; PhD, 1971, University of California (Santa Cruz); MD, 1974, Columbia University; oncology.

Siscovick, David S. * 1987; MD, 1976, University of Maryland; epidemiology.

Smith, Lynne T. * 1981, (Research); PhD, 1985, University of Washington; synthesis and organization of connective tissue in development and in inherited disorders.

Sparkman, Donal R. 1947, (Emeritus); MD, 1934, University of Pennsylvania.

Stadius, Michael L. 1993; MD, 1978, University of Oregon; cardiology.

Stewart, Patricia S. 1975; MA, 1965, MD, 1969, University of West Virginia; oncology.

Surawicz, Christina M. 1976; MD, 1973, University of Kentucky; gastroenterology.

Swenson, Erik R. 1983; MD, 1979, University of California (San Diego); pulmonary medicine.

Tait, Jonathan F. * 1983, (Adjunct); MD, 1983, PhD, 1983, Washington University; biochemistry of blood coagulation, laboratory diagnosis of genetic disorders.

Tempel, Bruce L. * 1988, (Adjunct); PhD, 1983, Princeton University; molecular neurobiology/neurogenetics, especially potassium channel gene structure and function.

Thompson, John A. 1982; MD, 1979, University of Alabama; oncology.

Van Voorhis, Wesley C. * 1986; PhD, 1983, Rockefeller University; MD, 1984, Cornell University; infectious diseases.

Watkins, Sandra L. 1986, (Adjunct); MD, 1981, University of Texas (Houston); nephrology.

Weigle, David S. 1981; MD, 1978, Harvard University; endocrinology and metabolism.

Wener, Mark H. * 1980; MD, 1974, Washington University; diagnostic immunology, immune complex diseases.

Wijsman, Ellen M. * 1987, (Research); PhD, 1981, University of Wisconsin; human quantitative and population genetics.

Wilson, Richard 1973; MD, 1962, University of Minnesota; gastroenterology.

Witherspoon, Robert P. 1976; MD, 1970, MS, 1970, Baylor University; oncology.

Wood, Francis C. Jr. * 1961, (Emeritus); MD, 1954, Harvard University; metabolism and endocrinology.

Wood, Robert W. 1979; MD, 1970, University of Rochester; internal medicine.

Assistant Professors

Back, Anthony L. 1988; MD, 1984, Harvard University; oncology.

Bavisotto, Linda M. 1985; MD, 1981, University of Wisconsin; oncology.

Beatty, Christopher D. 1986; MD, 1983, University of Vermont; pulmonary and critical care medicine.

Benditt, Joshua O. 1994; MD, 1982, University of Washington; pulmonary and critical care medicine.

Braddock, Clarence H. 1993; MD, 1981, University of Chicago; internal medicine, critical care and public ethics.

Bradley, Katharine A. 1991; MD, 1987, Stanford University; MPH, 1993, University of Washington; general internal medicine.

Brodtkin, Carl * 1989; MD, 1983, University of Colorado (Denver); hepatic effects of occupational solvent exposure; ventilatory decline in asbestos-exposed workers.

Carvalho, Paula G. 1991; MD, 1984, University of Washington; pulmonary and critical care medicine.

Celum, Connie L. 1987; MD, 1984, University of California (San Francisco); infectious diseases.

Chambers, Joseph W. 1987; MD, 1984, Yale University; cardiology.

Chauncey, Thomas R. 1988; MD, 1985, Rush Medical College; oncology.

Cheng, Edith Y. 1987, (Adjunct); MS, 1979, Sarah Lawrence College; MD, 1987, University of Washington; genetics.

Cooper, Mindy A. 1994; MD, 1987, George Washington University; nephrology.

Corson, Marshall A. 1994; MD, 1981, Baylor University; cardiology.

Deem, Steven A. 1992, (Adjunct); MD, 1984, Southern Illinois University; critical care.

Disis, Mary L. 1990; MD, 1986, MS, 1986, University of Nebraska; oncology.

Dolack, George L. 1985; MD, 1981, University of Washington; cardiology.

Dugdale, David C. 1991; MD, 1982, University of Pennsylvania; general internal medicine.

Ellis, Georgiana K. 1985; MD, 1982, University of Washington; oncology.

Epner, Elliot M. 1986; MD, 1983, PhD, 1985, Columbia University; oncology.

Every, Nathan R. 1991; MD, 1988, Emory University; MPH, 1993, University of Washington; cardiology.

Fishbein, Daniel P. 1984; MD, 1980, Albert Einstein College of Medicine; cardiology.

Gauthier, Verlene Joyce 1986; MD, 1984, PhD, 1984, University of Washington; rheumatology.

Gernsheimer, Terry B. 1986; MD, 1979, State University of New York (Stony Brook); hematology.

Glenney, Robb 1987; MD, 1984, University of Virginia; pulmonary and critical care medicine.

Goldbaum, Gary M. * 1989, (Adjunct); MD, 1978, University of Colorado (Denver); MPH, 1989, University of Washington; the epidemiology of human behaviors that increase risk for disease.

Goldstein, Erika A. 1984; MD, 1981, University of Rochester; general internal medicine.

Goodman, Richard B. 1986; MD, 1982, University of Oklahoma; pulmonary and critical care medicine.

Greenbaum, Carla J. 1987; MD, 1981, Brown University; metabolism, endocrinology and nutrition.

Gruenewald, David A. 1987; MD, 1983, University of Chicago; gerontology and geriatric medicine.

Higano, Celestia S. 1984; MD, 1979, University of Massachusetts; oncology.

Hockenbery, David M. * 1994; MD, 1982, Washington University; gastroenterology.

Horwitz, Marshall S. 1992; MD, 1990, PhD, 1988, University of Washington; transcription regulation.

Hudgins, Louanne 1993, (Adjunct); MD, 1984, University of Kansas; medical genetics.

Jackson, J. Carey 1990; MPH, 1980, University of Hawaii; MD, 1986, Michigan State University; general internal medicine.

Jarvik, Gail P. 1991; MS, 1983, PhD, 1986, University of Michigan; MD, 1987, University of Iowa; medical genetics.

Jobe, Kathleen A. 1989; MD, 1986, University of Colorado (Denver); internal medicine.

Key, Mark A. 1993; PhD, 1985, MD, 1987, Case Western Reserve University; medical genetics.

Keifer, Matthew C. * 1987; MD, 1982, University of Illinois; the human health effects of pesticide exposure.

Kovach, Nicholas L. 1987; MD, 1984, Oregon Health Sciences University; hematology.

Kowdley, Kris V. 1993; MD, 1985, Mt Sinai School of Medicine; gastroenterology.

Lessler, Daniel 1990; MD, 1986, Stanford University; MHA, 1992, University of Washington; physician management and decision-making, pharmacoeconomics.

Levy, Wayne C. 1985; MD, 1985, Loma Linda University; cardiology.

Linenberger, Michael L. 1986; MD, 1982, University of Kansas; hematology.

Maloney, David G. 1995; MD, 1985, PhD, 1991, Stanford University; medical oncology.

McCormick, Wayne C. 1987; MD, 1983, Washington University; gerontology and preventative medicine.

McElrath, Margaret Juliana 1990; PhD, 1978, MD, 1980, Medical University of South Carolina; infectious diseases.

McGee, Steve R. 1987; MD, 1980, Washington University; general internal medicine.

Mengert, Terry J. 1987; MD, 1984, University of Washington; emergency medicine.

Nash, Richard A. 1994; MD, 1977, University of Manitoba (Canada); oncology.

O'Brien, Kevin 1988; MD, 1984, University of Washington; cardiology.

Odland, Peter B. 1990; MD, 1984, Chicago Medical School; dermatologic surgery.

Olson, Carin M. 1994; MD, 1978, Ohio State University; general internal medicine.

Petersdorf, Effie Wang 1985; MD, 1982, McGill University (Canada); oncology.

Petersdorf, Stephen H. 1986; MD, 1983, Brown University; oncology.

Poole, Jeanne E. 1985; MD, 1980, University of Washington; cardiology.

Presland, Richard B. 1989, (Adjunct Research); PhD, 1987, University of Adelaide (Australia).

Radich, Jerald P. 1987; MS, 1979, Harvard University; MD, 1983, University of California (Davis); oncology.

Reed, May J. 1990; MD, 1986, Harvard University; geriatric medicine and gerontology.

Reilly, Dominic F. 1991; MD, 1988, University of Washington; general internal medicine.

Reiner, Alexander P. 1988; MD, 1984, Johns Hopkins University; hematology.

Rhoads, Caroline S. 1992; MD, 1989, University of Pennsylvania; general internal medicine.

Russell, David William 1991; PhD, 1988, Rockefeller University; MD, 1989, Cornell University; hematology.

Ryan, Caroline A. 1986; MDCM, 1981, McGill University (Canada); infectious disease.

Sabaith, Daniel E. * 1993, (Adjunct); PhD, 1989, MD, 1989, University of Pennsylvania; regulation of gene expression in hematopoietic cells.

Sandmaier, Brenda M. 1986; MD, 1983, University of Alberta (Canada); oncology.

Sasso, Eric H. 1984; MD, 1980, University of California (San Diego); rheumatology.

Schwartz, Michael W. 1987; MD, 1983, Rush Medical College; metabolism and endocrinology.

Sheffield, John V. L. 1992; MD, 1989, Harvard University; general internal medicine.

Skerrett, Shawn J. 1983; MD, 1978, New York University; pulmonary and critical care medicine.

Smith, Curtis Scott 1989; MD, 1980, University of Washington; general internal medicine.

Spach, David H. 1989; MD, 1986, Duke University; infectious diseases.

Stapleton, Ann E. 1987; MD, 1984, Albert Einstein College of Medicine; allergy and infectious diseases.

Steinberg, Kenneth P. 1989; MD, 1985, New York Medical College; pulmonary and critical care medicine.

Stern, Eric J. 1992, (Adjunct); MD, 1985, University of Medicine & Dentistry of New Jersey; chest radiology.

Sugg, Nancy K. 1989; MD, 1983, University of Maryland; internal medicine.

Wipf, Joyce E. 1987; MD, 1984, University of Minnesota; general internal medicine.

Instructor

Staiger, Thomas O. 1990, (Acting); MD, 1985, University of Washington.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Course numbers with a P suffix are not graduate courses and are restricted to medical student enrollment only.

MED 498 Undergraduate Thesis (*) *Paauw* Prerequisite: permission of department. Offered: AWSpS.

MED 499 Undergraduate Research (*) *Paauw* Case studies, with laboratory research. Available to undergraduates and medical students. Prerequisite: permission of department. Offered: AWSpS.

MED 505P Preceptorship in Medicine (1) *Paauw* To provide opportunity for first- and second-year medical students to gain personal experience with medical practice situations by being stationed with carefully selected clinical faculty members in their offices. Prerequisite: permission of department. Offered: AWSpS.

MED 510 Health Issues of Sexual Minorities (1) *Greenberg* Introduction to the special health care issues and barriers confronting persons identified as bisexual, gay, lesbian, or transgendered. Includes lectures, panels, and case presentations by faculty and community experts. Offered: Sp.

MED 530 AIDS: A Multidisciplinary Approach (2) *Koutsky, Kreiss* Comprehensive overview of the public health, clinical, and laboratory aspects of AIDS. Topics include the pathogenesis, natural history, and management of human immunodeficiency virus (HIV) infections. The impact of AIDS on community and global health care and prospects for prevention and control. Offered: jointly with EPI 530; A.

MED 531P Human Genetics (*) *Stamatoyannopoulos* Weekly seminar dealing with a variety of topics in medical genetics given by faculty of the Division of Medical Genetics and related departments and divisions. Open to medical students with a good foundation in genetics.

MED 532 Statistical Methods in Medical Genetics (2) *Wisman* Theory and application of statistical techniques used in medical genetics. In-depth discussion of linkage and segregation analysis and ascertainment problems. Applications stressed with reference to assumptions and limitations. Data sets analyzed with current computer programs. Prerequisite: knowledge of genetics or permission of instructor. Offered: jointly with BIOT 532.

MED 533P Clinical Endocrinology (2) *Chait* Emphasis on the most major and dependable symptoms, signs, laboratory tests, and therapy for clinical endocrinopathies. Patient illustrated. Limited to second-year medical students. Offered: W.

MED 536 Topics in Clinical Neurology (1) *Bird, Longstreth, Swanson* Lectures are presented on common topics in clinical neurology, such as epilepsy, stroke, coma, drug overdose, dementia, pediatric neurology, neuro-ophthalmological emergencies, headaches, myelopathies, infectious diseases. Offered: S.

CONJ 550P Clinical Infectious Diseases (3) *Miller* See Conjoint Courses. Offered: W.

CONJ 553P Nutrition for Physicians (1) *Lipkin* See Conjoint Courses. Offered: Sp.

UCONJ 555 Principles of STD/HIV Research (3) *Lukehart* See University Conjoint Courses. Offered: S.

MED 599P Transfusion Machine (3) *Reiner* Group discussions and didactic sessions cover broad

category of transfusion medicine. Hands-on laboratory experience in red cell serology/compatibility, coagulation, and histocompatibility with emphasis on diagnosis and management of clinical problems. Based at Puget Sound Blood Center. Prerequisite: fourth-year medical student standing; third-year student standing with permission of instructor.

MED 604P Clinical Preceptorship in Internal Medicine (8) *Patterson (Friday Harbor), Shima (Forks), Thorson (Longview)* Working closely with primary-care physicians, the student is exposed to the private practice of internal medicine in a small community. Operating on a one-to-one basis with an internist, the student evaluates and manages inpatients and outpatients on a primary care, consultative, and emergency basis. Prerequisite: 665P. (Four weeks, full-time.) Offered: AWSpS.

MED 640P Dermatology Clinic (*, max. 5) *Olerud* Students attend dermatology clinic on Monday mornings and Thursday afternoons for twelve weeks. Two half-days per week. Prerequisite: 665P. Offered: AWSpS.

MED 642P Clinical Oncology (8) *Stewart (Fred Hutchinson Cancer Research Center)* Students functioning as primary physicians are responsible for the workups and daily care of patients receiving marrow transplants, high-dose chemotherapy or immunotherapy on an intensive-care research ward. Emphasis is on the management and supportive care of patients with pancytopenia and immunosuppression, transplantation biology, cancer chemotherapy, and infectious disease problems. Prerequisite: 665P. (Four weeks.) Offered: AWSpS.

MED 644P Management of Sexually Transmitted Diseases (2) *Corey, Handsfield, Holmes, Stamm* Instruction and clinical experience in diagnosis, treatment, and management of sexually transmitted diseases. Instruction in genitourinary physical examination skills; relevant laboratory techniques and management of patients with STDs. Prior to the elective, each student must review a packet of didactic materials. Prerequisites: 665P, SURG 665P, and OB GYN 665P. Offered: AWSpS.

MED 645P Clinical Geriatric Medicine (8) *Matsumoto* Full time spent caring for patients in a half-day outpatient clinic each week, work up and follow inpatients on the geriatric evaluation unit, actively participate in twice-weekly attending and multidisciplinary team rounds, attend weekly conferences of the Division of Gerontology. Prerequisite: 665P. (Limit: one student.) Offered: AWSpS.

MED 646P Clinical Electroencephalography (*, max. 12) *Chatriain, Vossler, Wilkus* For third- and fourth-year medical students who desire to acquire familiarity with the techniques, interpretive criteria, and clinical applications of electroencephalography, long-term EEG-video-audio monitoring, computer-averaged evoked potentials, and other clinical neurophysiological techniques. Prerequisites: completion of Human Biology series. Offered: AWSpS.

MED 650P Advanced Medical Genetics (*, max. 5) *Stamatoyannopoulos* Summer course intended for third-year students who would like to increase their background in specific areas of medical genetics. Involves seeing patients with the instructor, reviewing the literature, analyzing clinical information, and writing a review on a selected topic. Prerequisite: HUBIO 554P. Offered: S.

MED 665P Clinical Clerkship (*, max. 24) *Paauw* Third-year medical students assume increasing responsibility for care of hospitalized patients in a teaching-hospital setting and participate in a four-week outpatient experience emphasizing continuity of care. Daily rounds with resident and attending physicians, with lectures and conferences. Progress evaluated by supervising physicians and a written examination. (Twelve weeks, full-time.) Offered: AWSpS.

MED 666P Advanced Clinical Clerkship in Internal Medicine—WAMI (12) *Paauw* Advanced clinical clerkship in internal medicine in three small urban communities. Supervised, structured experience in dealing with situations commonly encountered by the practicing internist. Continuity of care and the relationship between care given in the ambulatory setting and in the hospital, as well as by other community health services, is emphasized. Prerequisite: 665P. Offered: AWSpS.

CONJ 677P Clinical Allergy and Immunology (*, max. 12) *Henderson* See Conjoint Courses. Offered: AWSpS.

MED 678P Clinical Dermatology (8) *Olerud* Participation in dermatology clinics and inpatient consultations at University of Washington Medical Center, Harborview Medical Center, Children's Hospital Medical Center, and Veterans Administration Hospital. Journal club and clinical conferences each week with entire staff. A continuing series of teaching seminars and weekly dermatopathology conferences. Prerequisite: 665P. (Four weeks.) Offered: AWSpS.

MED 679P Clinical Gastroenterology (8) *Lee* Participation in consulting ward rounds, procedures, conferences, and selected clinics with full-time divisional staff at University and Veterans Administration hospitals, and at Pacific and Harborview medical centers, plus directed tutorial work. Prerequisite: 665P. (Four weeks, full-time.) Offered: AWSpS.

MED 680P Rheumatology (8) *Mannik* Full-time inpatient-outpatient clerkship in rheumatology. Clinical experience provided in diagnosis and treatment of rheumatic diseases, utilizing outpatient clinics and hospitalized patients at the University of Washington Medical Center, Harborview Medical Center, or VAMC. Emphasis on concepts in pathophysiology, diagnosis, and treatment of these diseases. In addition to patient contact, reading, seminars, and preceptorial sessions are the methods of instruction. Prerequisite: 665P. Offered: AWSpS.

MED 682P Clinical Cardiology and Electrocardiography (8) *Cobb (Harborview Medical Center), Eiriksson (Boise Veterans Administration Medical Center), Dolack (University of Washington Medical Center), Chamusco (Madigan Hospital Medical Center), Ritchie (Veterans Administration Hospital)* Clerkship in clinical cardiology—combined inpatient-outpatient assignments, ECG interpretation. Prerequisite: 665P. (Four weeks.) Offered: AWSpS.

MED 683P Clinical Respiratory Disease and Critical Care Medicine (8) *Pierson* Training in respiratory disease diagnosis and pulmonary therapy, with special emphasis on cardiopulmonary function testing and interpretation. Inpatient and outpatient teaching rounds, conferences, and basic science integration. Prerequisite: 665P. (Four weeks.) Offered: AWSpS.

MED 684P Clinical Hematology/Oncology (8) *Abkowitz (of Washington Medical Center), Harlan (Harborview Medical Center), Roth (Veterans Administration Hospital)* Outpatient and inpatient experience with hematologic/oncologic disorders. The elective includes teaching rounds, conferences, and evaluation of laboratory work. Prerequisite: 665P. (Four weeks.) Offered: AWSpS.

MED 685P Clinical Genetics (*, max. 24) *Bird, Byers, Motulsky, Stamatoyannopoulos* Full-time clinical clerkship in medical genetics. Provides extensive exposure to variety of genetic diseases and genetic counseling. Students work in three clinics (Monday, Tuesday, Thursday), response to in-house consultation requests, attend rounds at Children's Hospital and Medical Center and University of Washington Medical Center and seminars at University of Washington Medical Center (Wednesday, Friday). Prerequisite: 665P. Offered: AWSpS.

MED 686P Clinical Neurology (8) *Swanson* Inpatient and outpatient experience at University of

Washington Medical Center, Veterans Administration Hospital, Harborview Medical Center, American Lake Veterans Administration Hospital, or Children's Hospital and Medical Center. Students attend clinical conferences and seminars with neurology staff and become familiar with diagnostic neurological procedures. Prerequisite: 665P. (Four weeks.) Offered: AWSpS.

MED 687P Ambulatory Medicine Elective (*, max. 12) Paauw (University of Washington Medical Center) Students acquire knowledge and skill in dealing with ambulatory patients with problems commonly encountered in the office practice of internal medicine. Prerequisite: 665P. (Minimum: two quarters.) Offered: AWSpS.

MED 688P Ward Medicine Subinternship (*, max. 24) Bremner (VAMC), Hammond (Providence), R. Jones (Madigan Hospital Medical Center), McMahon (Anchorage), Robertson (Swedish Hospital Medical Center), Root (Harborview Medical Center) Students act in the capacity of interns on the medical wards under supervision of house staff and visiting physicians. They attend all regular medicine rounds and conferences as their schedules permit. Prerequisite: 665P. (Four or six weeks.) Offered: AWSpS.

MED 689P Clinical Infectious Diseases (8) Stamm (University of Washington Medical Center) Students participate in the consulting service throughout the hospital, attend daily plate rounds, conferences, and seminars. (Four weeks.) Holmes (Harborview Medical Center), Miller (Veterans Administration Hospital) Participate in consulting service throughout hospital to learn microbiological aspects of infectious diseases through the clinical laboratories. Prerequisite: 665P. (Four weeks.) Offered: AWSpS.

MED 690P Cardiology Subinternship (8) Kennedy (University of Washington Medical Center) Students act in the capacity of interns on the cardiology service under the supervision of house officer. Prerequisite: 665P. (Four weeks.) Offered: AWSpS.

MED 691P Primary Care (12) Paauw Six-week, full-time ambulatory care block in primary care internal medicine. Students participate in several clinics at University of Washington Medical Center following a panel of patients in medicine, rheumatology, and virology clinics. Prerequisites: 665P and permission of instructor. Offered: AWSpS.

MED 692P Clinical Endocrinology and Metabolism (*, max. 12) Weigle (Seattle-based program); Jones (Madigan) Clerkship in clinical endocrinology and metabolism combined inpatient and outpatient assignments at selected hospitals. Prerequisite: 665P. Offered: AWSpS.

MED 693P Nephrology and Fluid Balance (8) Couser (University of Washington Medical Center), Zager (Harborview Medical Center), Sherrard (Veterans Administration Hospital) Students see clinical nephrologic problems under close supervision, participate in nephrology and transplant rounds, see consults with renal fellow and attending, and work up patients in renal clinics, participate in seminars with clerks from all three hospitals. Prerequisite: 665P. (Four weeks.) Offered: AWSpS.

MED 694P Harborview Evening Clinic (2) Goldstein A longitudinal elective for senior medical students who assume primary responsibility for a panel of medical patients in an outpatient clinic. Direct care of patients is supplemented by didactic sessions dealing with issues in ambulatory care. Students are strongly encouraged to participate for four quarters. Prerequisites: 665 and permission of instructor. Offered: AWSpS.

MED 695P Clinical Aspects of Aging (8) McCormick (Harborview Long Term Care Service and Harborview Medical Center) Work with elderly patients as subintern with Senior Care Program. Inpatient and ambulatory setting in nursing homes and patients'

homes. Interdisciplinary approach. Prerequisite: 665P. Offered: AWSpS.

MED 697P Medicine Special Electives (*, max. 24) Paauw Special clerkship, externship, or research opportunities that can at times be made available at institutions other than University of Washington. Faculty can advise students of opportunities. Students wishing to elect this course should obtain from Dean's office a special assignment form at least three months before preregistration. Prerequisite: permission of department. (Two, four, six, or twelve weeks.) Offered: AWSpS.

Microbiology

G315 Health Sciences

Microbiology is a natural science that deals with cellular and acellular forms of life including bacteria, fungi, protozoa, algae, and viruses. It is concerned with the nature and properties of these entities, their effects on humans and the environment, and how they can be exploited to provide useful products.

Undergraduate Program

Bachelor of Science

Admission Requirements: A minimum of 75 credits applicable to graduation, with an overall GPA of 2.25 in prerequisite chemistry and biology courses. Students should complete departmental requirements in biology and chemistry (inorganic and organic) before applying for admission.

Major Requirements: Minimum 90 credits in the biological, physical, and mathematical sciences, to include: BIOL 201, 202, 203 or equivalent (15 credits/one year); MICROM 402, 410, 411, 412, 431, 441, 442, 443, 496, and 445 or 450, and approved microbiology electives (36 credits, not to include MICROM 301, 302, 319, 331); CHEM 140, 150, 160 (12 credits) (CHEM 141 recommended) (or CHEM 145, 155); CHEM 223, 224 (8 credits) (or 237, 238, 239; or 335, 336, 337); PHYS 114, 115 (8 credits) (or 121/131, 122/132) (PHYS 116 or 123/133 recommended); either MATH 112 or 124 or Q SCI 381 or STAT 311 (5 credits); BIOG 405, 406 (6 credits) (or 440, 441, 442). In all required and elective microbiology courses used toward graduation, a minimum 2.25 cumulative GPA and a minimum grade of 1.8 in each course. Transfer students must complete at least 20 of the required and elective microbiology credits at the UW.

Graduate Program

The Department of Microbiology offers a graduate program leading to the Doctor of Philosophy degree. Students interested in graduate work should obtain the necessary application forms from the department.

The choice of an adviser and research problem are matters of mutual consent between the student and a faculty member. The course work taken by a graduate student depends to a certain extent upon the student's background and chosen area of specialization, but, in general, courses are chosen from the fields of microbiology, immunology, biochemistry, genetics, and pathobiology. A master's degree program either with or without thesis is available on a very limited basis. An M.S. degree is not necessarily a prerequisite for the Ph.D. degree.

Applicants are evaluated by a committee that considers the student's grades, scores on the Graduate Record Examination, research experience, letters of recommendation, and any other data that might provide an indication of the student's capabilities for success in a career in science.

Students are normally admitted into the graduate program only in autumn quarter, and all application materials should be received by the department no later than the preceding December 31. Graduate Record Examination aptitude scores are required as part of the application, and the examination should be taken no later than October. Three letters of recommendation must also be sent directly to the department.

Students with a variety of academic backgrounds are accepted for graduate study in microbiology, but it is highly desirable that their undergraduate preparation include at least a year of general chemistry and a year of college physics, courses in organic chemistry and quantitative analysis, calculus, one year of biology, and courses in genetics, biochemistry and microbiology.

Students in the Ph.D. program are usually supported by funds from training grants, research grants, or teaching assistantships.

Correspondence and Information

Michael Katze
Graduate Program Coordinator
Department of Microbiology, Box 357242

Faculty

Chair

Eugene W. Nester

Professors

Champoux, James J. * 1972; PhD, 1970, Stanford University; DNA replication, tumor virology.

Clark, Edward A. * 1984; PhD, 1977, University of California (Los Angeles); lymphocyte surface molecules, lymphocyte activation and cell communication.

Corey, Lawrence * 1977; MD, 1971, University of Michigan; laboratory medicine: diagnosis, therapy, and pathogenesis of viral infections, AIDS virus.

Coyle, Marie B. * 1973; PhD, 1965, Kansas State University; DNA probes and GLC for rapid identification of mycobacteria and corynebacteria.

Douglas, Howard C. 1941, (Emeritus); PhD, 1949, University of California (Berkeley).

Evans, Charles A. 1946, (Emeritus); MD, 1937, PhD, 1943, University of Minnesota; microbial flora of human skin, medical virology.

Floss, Heinz G. * 1987, (Adjunct); PhD, 1961, Technical University of Munich (Germany); bioorganic and natural products chemistry.

Galloway, Denise A. * 1982, (Research); PhD, 1976, City University of New York; viral pathogenesis and neoplasia.

Gilliland, Bruce C. * 1968, (Adjunct); MD, 1960, Northwestern University; rheumatology/immunology.

Gordon, Milton * 1959, (Adjunct); PhD, 1953, University of Illinois; molecular basis of plant tumors, control of gene expression in plants.

Greenberg, Philip D. * 1978, (Adjunct); MD, 1971, State University of New York (Downstate); molecular, cellular, viral, and tumor immunology.

Groman, Neal B. * 1950, (Emeritus); PhD, 1950, University of Chicago.

Hakomori, Sen-Itiroh * 1967; MD, 1951, DMedSc, 1956, Tohoku Imperial University (Japan); role of glycosphingolipids in defining antigenicity, cellular interaction.

Holmes, King K. * 1969, (Adjunct); MD, 1963, Cornell University; PhD, 1967, University of Hawaii; clinical epidemiology and pathogenesis of infectious diseases.

Katze, Michael Gerald * 1987; PhD, 1980, Hahnemann Medical College; regulation of viral gene expression at the translational level.

Kenny, George E. * 1961, (Adjunct); PhD, 1961, University of Minnesota; human immune response to infectious diseases, detection and biology of mycoplasmas.

Klebanoff, Seymour * 1962, (Adjunct); MD, 1951, University of Toronto (Canada); PhD, 1954, University of London (UK); infectious disease.

Lidstrom, Mary E. 1995; MS, 1975, PhD, 1977, University of Wisconsin; environmental biotechnology, molecular bioengineering.

Linial, Maxine L. * 1982, (Research); PhD, 1970, Tufts University; retroviral replication and genetics, retroviral transformation.

Lory, Stephen * 1984; PhD, 1980, University of California (Los Angeles); PhD, 1954, University of California (Los Angeles); biochemistry, genetics of microbial virulence factors.

Lukehart, Sheila A. 1980, (Adjunct Research); PhD, 1978, University of California (Los Angeles); infectious diseases.

Mannik, Mart * 1966, (Adjunct); MD, 1959, Case Western Reserve University; rheumatology.

Miller, Robert C. 1995; PhD, 1969, University of Pennsylvania.

Mullins, James I. 1994; PhD, 1978, University of Minnesota; cell biology and biochemistry.

Nester, Eugene W. * 1962; PhD, 1959, Case Western Reserve University; genetics and biochemistry of bacterial-plant cell interactions, tumorigenesis.

Plorde, James J. * 1967, (Adjunct); MD, 1959, University of Minnesota; infectious diseases, antibiotic-resistant nosocomial infections.

Rubens, Craig E. * 1984, (Adjunct); PhD, 1978, Medical University of South Carolina; MD, 1982, University of Washington; molecular pathogenesis of Group B streptococcal infections in newborn infants.

Sherris, John C. * 1959, (Emeritus); MBBS, 1948, MD, 1950, University of London (UK); medical microbiology, antibiotic action and resistance.

Staley, James T. * 1971; PhD, 1967, University of California (Davis); microbial ecology, bacterial systematics, general microbiology.

Stuart, Kenneth Daniel * 1985, (Adjunct); PhD, 1969, University of Iowa; molecular biology of parasites.

Weiser, Russell S. 1931, (Emeritus); PhD, 1934, Washington University; microbiology and immunology.

Associate Professors

Fritsche, Thomas R. * 1984; MD, 1981, PhD, 1984, University of Minnesota; systematics and ecology of animal parasites; medical microbiology.

Geballe, Adam Philip 1988, (Adjunct); MD, 1978, Duke University; virology.

Hughes, Kelly T. * 1989; PhD, 1984, University of Utah; genetics, gene regulation, microbial physiology, and metabolism.

Lamont, Richard J. * 1988, (Adjunct); PhD, 1985, University of Aberdeen (UK); pathogenic mechanisms and taxonomy of oral bacteria.

Lara, Jimmie Cano * 1972; PhD, 1970, University of California (Riverside); microbial physiology and crytology, sporulation and gas vesicle synthesis and regulation.

Leigh, John A. * 1985; PhD, 1983, University of Illinois; bacterial physiology; biochemistry, genetics.

Miller, Samuel I. 1995; MD, 1979, Baylor University; molecular pathogenesis of bacterial diseases.

Moseley, Stephen L. * 1985; PhD, 1981, University of Washington; molecular basis of pathogenesis in *E. coli* diarrhea.

Overbaugh, Julie Maureen * 1988; PhD, 1983, University of Colorado (Boulder); molecular mechanisms of virus-host cell interactions/retroviral pathogenesis/aids.

Tarr, Phillip I. 1988, (Adjunct); MD, 1980, Yale University; gastroenterology/infectious diseases.

Vessella, Robert L. 1989, (Adjunct); PhD, 1974, University of Mississippi; tumor markers and immunology.

Wong, Timothy Chee-Hing * 1983; PhD, 1979, University of Texas, Southwestern; viral gene expression in chronic infections and oncogenesis.

Assistant Professors

Harwig, Russell P. * 1991, (Research); PhD, 1989, University of Washington; environmental microbiology, bioremediation, molecular microbial ecology, microbial phylogenetics.

Lampe, Mary F. 1988, (Adjunct Research); MS, 1957, University of Washington; microbiology laboratory teaching.

Law, Che-Leung 1990, (Research); PhD, 1990, University of Minnesota; immunology, B cell activation and development.

Traxler, Beth A. * 1992; PhD, 1987, Carnegie-Mellon University; bacterial physiology, genetics, and membrane protein biochemistry.

Lecturers

Anderson, Denise G. 1982; MS, 1985, University of Washington; microbiology laboratory teaching.

Barnes, Glover W. * 1969; MA, 1955, PhD, 1961, State University of New York (Buffalo); tissue, organ immunology.

Bicknell, Mary 1975; MS, 1962, University of Washington; microbiology laboratory teaching.

Cramer, Dorothy I. 1951; BS, 1945, University of Washington; microbiology laboratory teaching.

Fulton, Janis R. 1983; MS, 1977, Montana State University; microbiology laboratory teaching.

Memmer, Ramona 1960; MS, 1957, University of Washington; microbiology laboratory teaching.

Parkhurst, Dale J. 1959; BS, 1960, University of Washington; microbiology laboratory teaching.

Course Descriptions

Courses for Undergraduates

See page 56 for explanation of course numbers, symbols, and abbreviations.

MICROM 301 General Microbiology (3) NW Lara, Nester Acquaints students with microorganisms and their activities. Topics include microbial cell structure and function, metabolism, microbial genetics, and the role of microorganisms in disease, immunity, and other selected applied areas. Prerequisite: two quarters of chemistry; recommended: a course in biological science. Offered: ASPS.

MICROM 302 General Microbiology Laboratory (2) NW Anderson, Bicknell, Fulton, Parkhurst Laboratory course primarily for students taking 301. Covers a variety of microbiological techniques, with experiments designed to illustrate major concepts of bacteriology, virology, and immunology. No auditors. Prerequisite: concurrent or previous registration in 301 or permission of instructor. Offered: ASPS.

MICROM 320 Media Preparation (2) NW Parkhurst Practical work in the preparation of culture media. Nutritional requirements of microorganisms and sterilization methods are considered. For students expecting to enter vocations involving laboratory work with bacteria. Credit/no credit only. Prerequisites: 301 and 302, or equivalent, and permission of instructor. Offered: AS.

MICROM 322 Applied Clinical Microbiology (5) NW Fritsche Practical experience in a clinical or public health laboratory; fifteen hours per week. For students majoring in medical microbiology. Three quarters advance sign-up in G315 Health Sciences recommended. Applicants are selected by interview. Prerequisites: 443 and permission of instructor. (Limit: three students.) Offered: AWSp.

MICROM 402 Fundamentals of General Microbiology Laboratory (3) NW Bicknell, Fulton Isolation of a broad range of nonpathogenic bacteria from natural sources, using selective and enrichment techniques, with microscopic and biochemical identification. Related exercises include genetics, quantitation, and growth kinetics. Prerequisite: 410, which may be taken concurrently, or permission of instructor. Offered: ASP.

MICROM 410 Fundamentals of General Microbiology I (3) NW Lara, Traxler Survey of the microbial world, metabolism, biosynthesis, regulation, growth, structure, and function. Required for students majoring in microbiology; recommended for students majoring in biology. Prerequisites: BIOL 201, 202, 203, and two quarters of organic chemistry. Offered: A.

MICROM 411 Gene Action (5) NW Hughes, Manoil Molecular genetics: description of fundamental genetic processes such as mutation, repair, genetic exchange, recombination, and gene expression. Use of genetic strategies to analyze complex biological processes. Focuses on prokaryotic organisms. Prerequisites: 410 or CHEM 237. Offered: jointly with GENET 411; W.

MICROM 412 Fundamentals of General Microbiology III (3) NW Leigh Structure, biochemical properties, and genetics of the major groups of prokaryotes. Required for students majoring in microbiology, recommended for students majoring in biology. Prerequisite: 410 or permission of instructor. Offered: Sp.

MICROM 431 Prokaryotic Recombinant DNA Techniques (3) NW Anderson Laboratory course emphasizing concepts and techniques/methodologies in recombinant DNA research employing bacteria and their viruses. Topics and experiments/demonstrations include genomic and plasmid DNA isolation, restriction mapping, cloning, transposon mutagenesis, sequencing, and Western and Southern blotting. No auditors. Prerequisite: 302 or 402 or permission of instructor. Offered: W.

MICROM 435 Microbial Ecology (3) NW Staley Consideration of the various roles that microorganisms, particularly bacteria and cyanobacteria, play in environmental processes. The interrelationships among microorganisms and the effects of the physical, chemical, and biological properties of their environment are discussed and assessed. Prerequisites: 412 or equivalent, or permission of instructor. Offered: even years; Sp.

MICROM 440 Introductory Bacteriology for Medical Technologists (1) NW Lara Limited introduction to basic microbiology, with focus on structure, metabolism, and genetics of medically important organisms. Prerequisite: medical technology student, or permission of instructor. Offered: A.

MICROM 441 Introduction to Immunology (4) NW General properties of immune responses; cells and tissues of immune system; lymphocyte activation and specificity; effector mechanisms; immunity to microbes; immunodeficiency and AIDS; autoimmune diseases; transplantation. Prerequisites: BIOL 203, organic chemistry, or permission of instructor, junior standing or above; recommended: biochemistry, cell biology and/or genetics. Offered: jointly with IMMUN 441; A.

MICROM 442 Medical Bacteriology (3) NW Cookson, Fritsche Medically important bacterial pathogens are discussed in terms of the clinical, therapeutic, and epidemiological aspects of diseases caused by them, molecular mechanisms of pathogen-

osis and their identification in the clinical laboratory. Laboratory course 443 coordinates. Prerequisites: 441, a prokaryotic cell structure and function course or permission of instructor. Offered: W.

MICROM 443 Medical Microbiology Laboratory (3) NW Coyle, Fritsche Required for medical technology students, microbiology majors; elective for medical students. Procedures for isolation and identification of pathogenic bacteria, testing their susceptibility to antibiotics. No auditors. Prerequisites: 441, 442 sequence taken concurrently or HUBIO 521P. Offered: AW.

MICROM 444 Medical Mycology and Parasitology (4) NW Coyle, Fritsche Consideration of medically important fungi and parasites, with emphasis on their biology in relation to disease and its laboratory diagnosis. For medical technology students, microbiology majors, and medical students as an elective. Prerequisites: basic biology. Offered: Sp.

MICROM 445 Medical Virology (2) NW Thouless, Wong An introductory course emphasizing basic understanding of medical virology and viral pathogenesis. The biochemical, replication, host-parasite relationships and pathogenesis of animal viruses are examined. Prerequisite: basic biology. Recommended: 441 or permission of instructor. Offered: jointly with PABIO 445; Sp.

MICROM 450 Molecular Biology of Viruses (3) NW Champoux, Wong Introduction to the molecular biology of viruses and virus-host relationships. Designed for advanced undergraduates and graduate students in the biological sciences. Coverage includes bacterial and animal viruses, with an emphasis on the molecular mechanisms of viral gene expression and regulation. Prerequisites: 410, 411 and/or either GENET 371 or 372. Offered: Sp.

MICROM 495- Honors Undergraduate Research (*) NW Leigh Specific problems in microbiology or immunology. Prerequisite: permission of honors adviser. Offered: AWSpS.

MICROM 496 Undergraduate Library Research (2) NW Leigh Introduction to library research and to the microbiological literature. Topics are assigned and supervised by staff members. Credit/no credit only. Prerequisite: permission of instructor; senior standing desirable. Offered: AWSpS.

MICROM 497 Microbiology Special Electives (*) NW Special clerkships, externships, or research opportunities are occasionally available at institutions other than the University of Washington. Obtain from the Dean's office a special assignment form and contact the Chairperson of the Department of Microbiology at least one month before preregistration. Limited to medical students. Prerequisite: permission of instructor.

MICROM 498 Undergraduate Thesis (*) For medical students. Prerequisite: permission of instructor.

MICROM 499- Undergraduate Laboratory Research (*) Leigh Specific problems in microbiology or immunology. Prerequisite: permission of departmental adviser; senior standing desirable. Credit/no credit only. Offered: AWSpS.

Courses for Graduates Only

MICROM 500 Introduction to Research (*, max. 20) Introduction to research areas of the faculty and the techniques employed in their investigations. Credit/no credit only. Prerequisite: graduate standing in microbiology or permission of instructor. Offered: AWSpS.

MICROM 510 Physiology of Bacteria (3) Traxler Topics of current interest concerning the molecular biology and physiology of bacteria. Prerequisites: 410 and BIOC 440, 441, and 442, or permission of instructor. Offered: odd years; W.

MICROM 518 Microbial Degradation of Toxic Contaminants (3) Herwig, Stensel, Strand Detailed survey of current understanding of microbiology and degradative pathways of industrial organic compounds, pesticides, plastics, oil, and metals. Microbial requirements for bioremediation. Methods of scientific investigation of microbial transformations. Requires basic understanding of metabolism and organic chemistry. Prerequisite: biological science course. Offered: jointly with CEWA/F M 518; Sp.

MICROM 520 Seminar (1) Traxler, Wong Credit/no credit only. Offered: AWSp.

MICROM 522 Current Research in Microbiology (1) Champoux Weekly student and faculty seminar presentations based on the current literature. Credit/no credit only. Prerequisite: graduate standing in microbiology. Offered: AWSp.

MICROM 525 Cell Surface Membrane in Cell Sociology and Immunology (2) Hakomori Structure and function of cell surface membranes in relation to various immunobiological and pathobiological phenomena e.g., differentiation, organization, infection, cancer. Prerequisites: BIOC 440, 441, 442, and permission of instructor. Offered: Sp.

MICROM 526 Research of Cell Surface Problems (1) Traxler Weekly research seminar and discussion of scientific literature pertaining to the process of membrane protein biogenesis. Prerequisite: permission of instructor.

MICROM 527 Genetic Approach to Complex Biological Processes (1) Hughes Current research as it applies to genetic approaches to complex biological processes in the area of microbiology. Offered: AWSpS.

MICROM 528 Salmonella Genetics (1) Hughes Review current literature in the area of gene regulation in *Salmonella typhimurium* and related studies in *Escherichia coli*. Prerequisite: graduate student standing; advanced undergraduates by permission of instructor. Offered: AWSpS.

MICROM 530 Biology and Evolution of Prokaryotes (4) Leigh, Staley Selected eubacterial and archbacterial groups studied. Students enrich, isolate, and characterize their own cultures as part of the laboratory. Prerequisites: 402, 412 or equivalents; open to qualified undergraduates by permission of instructor. Offered: even years; A.

MICROM 532 Seminar in General Microbiology (1, max. 15) Leigh Weekly seminar concerning research topics in the genetics and biochemistry of selected bacteria. Credit/no credit only. Prerequisites: 410, permission of instructor. Offered: AWSpS.

MICROM 540 Virology (3) Katze Lecture-seminar course concerning host-viral interactions. Prerequisite: permission of instructor. Offered: even years; W.

MICROM 552 Pathogenic Microbiology (4) Katze, Lory Introduction to concepts and techniques of general microbiology, to major groups of infectious agents affecting the human body, and to mechanisms and models of pathogenesis. Prerequisites: BIOL 201, 202, 203, or equivalent and some basic immunology; for dental students, others by permission of instructor. Offered: Sp.

MICROM 553 Molecular Mechanisms of Bacterial Pathogenesis (3) Lory, Moseley, Rubens Mechanisms of bacterial pathogenesis explored at the molecular, genetic, and cellular levels through selected models as presented in the current scientific literature. Prerequisite: 411 or equivalent. Offered: odd years; A.

MICROM 554 Seminar in Molecular and Medical Microbiology (1, max. 15) Lory, Moseley Weekly one-hour seminar in which recent advances in molecular biology of microbial pathogenesis or the current research of the participants is presented and dis-

cussed critically. Credit/no credit only. Prerequisite: permission of instructor. Offered: AWSp.

MICROM 555 Advanced Clinical Microbiology (2.5) Fritsche Attendance at daily plate rounds of the Division of Clinical Microbiology. Designed to increase understanding of clinical microbiological work and its application to the care of the patient. Credit/no credit only. Prerequisites: 443 and permission of instructor. Offered: AWSp.

MICROM 556 Clinical Microbiology Training and Research (*, max. 12) Fritsche Training in clinical microbiology and applied research. Attendance at daily laboratory rounds in addition to bench-side training and research. For medical students and microbiology graduate students only. Credit/no credit only. Prerequisites: 443 and permission of instructor.

MICROM 560 Research and Journal Club in Retrovirology (1) Linial Weekly research seminar and discussion of literature in areas of retroviral replication and transformation. Prerequisite: graduate or permission of instructor. Offered: AWSpS.

MICROM 562 Oncogene and Retrovirus Research Seminar (1) Linial, Overbaugh Weekly discussions of ongoing research related to retroviral replication, retroviral oncogenes and pathology. Prerequisite: graduate standing or permission of instructor. Offered: AWSpS.

MICROM 585 Research in Cell and Molecular Biology (1, max. 15) Champoux Weekly research seminar. Credit/no credit only. Prerequisite: permission of instructor. Offered: AWSpS.

MICROM 599 Topics in Virology (2) Current problems in microbiological or immunological research. Credit/no credit only. Prerequisite: permission of instructor.

MICROM 600 Independent Study or Research (*) Credit/no credit only. Offered: AWSpS.

MICROM 700 Master's Thesis (*) Credit/no credit only.

MICROM 800 Doctoral Dissertation (*) Credit/no credit only. Offered: AWSpS.

Molecular Biotechnology

The Department of Molecular Biotechnology was created with the conviction that the future of biology and medicine lies in the ability to apply a multidisciplinary approach to the analysis of complex systems. The cellular interactions in the immunologic and neural networks regulate some of the most complex behaviors and responses of living organisms. The 100,000 genes that dictate the complex system of human development constitute another example. The organization of these genes on the chromosome, their sequence polymorphism, transcriptional control, and evolutionary relationships must be analyzed to fully understand the intricacies of development. Progress in understanding these systems is directly correlated to the sophistication of the available research tools. The department is committed to training students to focus on the development and/or the application of powerful new tools to leading-edge problems in biology and medicine. The nature of the tools will change in response to the challenges posed by contemporary biology.

Graduate Program

The graduate program in molecular biotechnology trains students to bring the knowledge and recent advances in a variety of disciplines—e.g., physics, chemistry, engineering, and computer sciences—to bear on the complex problems of modern biology and

medicine. The program emphasizes extensive research experience within an interdisciplinary and state-of-the-art research environment.

The program has a broad, interdisciplinary nature. Therefore, each student's educational objectives will differ. Students are guided by their Dissertation Supervisory Committee to obtain knowledge of selected topics in four areas as well as a thorough knowledge of topics related to their chosen area of research. The four areas are (1) molecular/cell biology and genetics, (2) chemistry, (3) physics and instrumentation, and (4) applied mathematics or computer science. This requirement can be met through a combination of molecular biotechnology courses, additional elective courses, and reading assignments tailored to the student's background and specific interest.

Doctor of Philosophy

The molecular biotechnology graduate program is designed to educate and stimulate students at the interface of biological, physical, and computational sciences. Students are trained to focus on the development and/or application of new tools to challenging biological problems. These tools include the development of new chemistries, instruments, and computer hardware or software for the analysis of DNA, proteins, or cells. The goal of the program is to provide students with a sound background in molecular and cellular biology, and a broad access to research expertise in disciplines outside biology. Accordingly, the faculty brings together skills in applied mathematics, biology, chemistry, computer sciences, physics, and instrument design. Particular areas of expertise include immunology, protein chemistry, nucleic acid chemistry, analytical cytogenetics, large-scale DNA mapping and sequencing (genomics), and informatics.

Research Facilities

The department is currently housed in the H and K wings in the Health Sciences Complex and in Fluke Hall. Students in the department are assigned space in the laboratories of faculty members with whom they do their rotations or dissertation research. State-of-the-art research facilities are available in the department for cellular, protein, and DNA analysis. Extensive computer and library resources are also available to students.

Admission Requirements

Admission to the Graduate School requires that a prospective student hold a baccalaureate degree from an accredited college or university in the U.S. or its equivalent in a foreign country. Students are required to have a cumulative GPA of 3.3 (B) or better, and to have taken and received high scores on the Graduate Record Examination (generally in the 80th percentile or higher).

In addition to completing the application requirements for the Graduate School, an applicant should also forward the following items to the Academic Counselor for the Graduate Program, Department of Molecular Biotechnology, Box 357730, University of Washington, Seattle, WA 98195-7730: (1) official copies of Graduate Record Examination scores for the general test, as well as the results of an advanced subject test; (2) a one- or two-page written description of previous research experience, combined with a brief statement of education/career objectives; (3) a minimum of three letters of recommendation from persons acquainted with the applicant's background (no specific form required); and (4) where appropriate, the results of the Test of English as a Foreign Language, indicative of proficiency in the English language. Students are admitted for the autumn quarter. The application deadline is February 1.

Faculty

Chair

Leroy E. Hood

Professors

Hood, Leroy E. * 1992; PhD, 1968, California Institute of Technology; molecular immunology, large-scale DNA mapping and sequencing, molecular evolution.

Karp, Richard Manning 1995, (Adjunct); PhD, 1959, Harvard University; combinatorial algorithms, computational complexity, parallel algorithms, computational biology.

King, Mary-Claire 1995, (Adjunct); PhD, 1973, University of California (Berkeley); human genetics.

Olson, Maynard V. 1992; PhD, 1970, Stanford University; large-scale genome mapping and sequencing.

Trask, Barbara J. * 1992, (Research); PhD, 1985, University of Leiden (Netherlands); in situ hybridization, analytical cytogenetics, analysis of large-scale DNA polymorphism.

Van Den Engh, Ger * 1992, (Research); PhD, 1976, University of Leiden (Netherlands); flow cytometry, quantitative cytogenetics, instrument design and development.

Associate Professors

Aebersold, Rudolf Hans 1993; PhD, 1983, University of Basel (Switzerland); development of technology for protein analysis, biochemistry of cell internal signaling pathways.

Green, Philip 1994; PhD, 1976, University of California (Berkeley); mathematical and computer methods for genome analysis.

Assistant Professors

Goverman, Joan M. * 1992; PhD, 1981, University of California (Los Angeles); immune recognition and tolerance, autoimmunity, T cell development, activation, antibody diversity.

Hunkapiller, Tim * 1992, (Research); PhD, 1992, California Institute of Technology; biological computation and genomic methodologies and analysis.

Nickerson, Deborah A. * 1992; PhD, 1978, University of Tennessee; automating the identification and typing of human DNA variations, genetic mapping, DNA diagnostics.

Yates, John R. III * 1992; PhD, 1987, University of Virginia; biological mass spectrometry, protein sequencing, computational methods for data analysis.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

MBT 450 Introduction to Molecular Biotechnology (2) Hood, Olson Rudiments of basic biology with emphasis on role of DNA and protein analysis. Prerequisite: substantial background in chemistry, physics, mathematics, computer science, engineering, or related discipline.

MBT 510 Technologies for Genome Analysis (3) Goverman, Nickerson, Trask Discussion of current and newly-emerging technologies in genome analysis with regard to applications in biology and medicine and to potential advantages and limitations. Prerequisite: permission of instructor. Offered: A.

MBT 520 Technologies for Protein Analysis (3) Aebersold, Yates Discussion of current and newly-

emerging technologies in protein analysis with regard to applications in biology and medicine and to potential advantages and limitations. Prerequisite: permission of instructor. Offered: W.

MBT 530 Advanced Instrumentation for Genome Analysis (3) van den Engh Presentation of principles and use of instruments for genome analysis. Discussion of limitations of present instruments and potential improvements. Theory of electrophoretic and fluorescence based DNA analysis techniques. Prerequisite: permission of instructor.

MBT 550 Seminar in Molecular Biotechnology (1, max. 12) van den Engh Presentation of independent research by students and faculty of the Department of Molecular Biotechnology and by invited speakers. Emphasis on new and original contributions to the field of molecular biotechnology. Credit/no credit only. Offered: AWSpS.

MBT 560 Molecular Biotechnology Literature Conference (1, max. 12) Presentation, discussion, and critical analysis of research results from the current literature in molecular biotechnology. Credit/no credit only. Offered: AWSpS.

MBT 599 Special Topics in Molecular Biotechnology (* max. 12) Nickerson Prerequisite: permission of instructor. Offered: AWSpS.

MBT 600 Independent Study or Research (*) Credit/no credit only.

MBT 700 Master's Thesis (*) Credit/no credit only.

MBT 800 Doctoral Dissertation (*) Credit/no credit only.

Neurological Surgery

700 9th Avenue, Harborview Medical Center

The Department of Neurological Surgery is dedicated to teaching and research in the entire spectrum of diseases of the central and peripheral nervous system. Instruction in this area is provided for medical students and postgraduate physicians.

The department's medical student instruction includes participation in the human biology curriculum as well as in elective basic science and clinical experiences. These are available at Harborview Medical Center, University of Washington Medical Center, Veterans Affairs Medical Center, and Children's Hospital and Medical Center, including the Epilepsy Center at Harborview. The department also has several course offerings correlating research and clinical problems of the nervous system, including the neuroscience research seminar, and clinical and basic science correlates of the epilepsies.

Selected medical students also may elect research experience within the Department of Neurological Surgery. The department research facilities are housed in the Medical Research Tower of the University of Washington Medical Center, at Harborview Hall, at Veterans Affairs Medical Center, and at the Epilepsy Center at Harborview. Investigations are under way at these institutions in many areas of neurophysiology, in behavioral research, in light and electron microscopic examination of the anatomy of the nervous system, in cerebral vascular physiology and in hemo-oncology.

In addition to undergraduate instruction, a fully certified residency program in neurological surgery is available for selected postgraduate physicians. The seven-year program emphasizes preparation for a career in academic neurosurgery.

Faculty

Chair

H. Richard Winn

Professors

Alvord, Ellsworth C. * 1960, (Adjunct); MD, 1946, Cornell University; neuropathology, experimental allergic encephalitis, multiple sclerosis, brain tumors.

Berger, Mitchell S. 1986; MD, 1979, University of Miami (Florida); neurooncology, pediatric neurosurgery.

Chatrjian, Gian E. 1959, (Emeritus); MD, 1951, University of Naples (Italy); electroencephalography and clinical neurophysiology.

Dikmen, Sureyya S. * 1974, (Adjunct); PhD, 1973, University of Washington; clinical neuropsychology, neuropsychological and psychosocial outcomes in traumatic head injury.

Dodrill, Carl B. 1973; MS, 1967, PhD, 1970, Purdue University; human neuropsychology, epilepsy, EEG and performance, antiepileptic medications and performance.

Fraser, Robert T. * 1976; PhD, 1976, University of Wisconsin; psychology.

Gruss, Joseph S. 1991, (Adjunct); MChB, 1969, University of Witwatersrand (South Africa); plastic surgery.

Harris, A. Basil 1967; MD, 1954, University of Alabama; neurosurgery, neuroanatomy, microvascular, arteriovenous malformations, epilepsy mechanisms.

Jaffe, Kenneth M. * 1981, (Adjunct); MD, 1975, Harvard University; pediatric rehabilitation, brain injury, neuromuscular diseases, congenital defects, electromyography.

Kelly, William A. 1959, (Emeritus); MD, 1954, University of Cincinnati; neurosurgery, neuroendocrinology.

Lam, Arthur M. 1986; MD, 1974, Western Ontario University (Canada); neuroanesthesia.

Levy, René H. * 1970; PhD, 1970, University of California (San Francisco); metabolic interactions among antiepileptic drugs and between cytokines and drugs.

Loeser, John D. 1969; MD, 1961, New York University; pain, neurophysiology.

Maravilla, Kenneth R. 1987; MD, 1970, State University of New York (Brooklyn); neuroradiology and neurosurgery.

Mayberg, Marc R. 1985; MD, 1978, Mayo Medical School; cerebrovascular disease, vasospasms, ultrastructure of cerebral arteries.

Mills, Richard P. 1978, (Adjunct); MD, 1968, Yale University; glaucoma, neuro-ophthalmology.

Ojemann, George A. 1966; MD, 1959, University of Iowa; neurophysiology, organization of higher functions in brain, language, memory.

Roberts, Theodore S. 1985; MS, 1952, MD, 1955, University of Wisconsin; neurologic surgery, stereotaxic surgery, pituitary and cerebrovascular disease.

Rubel, Edwin W. * 1986; PhD, 1969, Michigan State University; developmental neurobiology, with special emphasis on vertebrate auditory system development.

Schwartzkroin, Philip A. * 1978; PhD, 1972, Stanford University; mechanisms of cortical excitability.

Shaw, Cheng-Mei * 1963, (Adjunct); MD, 1950, National Taiwan University; neuropathology, immunopathology, neurotoxicology, congenital malformation.

Spence, Alexander M. 1974, (Adjunct); MD, 1965, University of Chicago; neurology, neuro-oncology.

Ward, Arthur A. 1948, (Emeritus); MD, 1942, Yale University; neurological surgery.

Westrum, Lesnick E. * 1966; MD, 1963, University of Washington; PhD, 1966, University College, London (UK); neuroanatomy, synaptology, plasticity, olfactory and trigeminal systems, dental pathways.

Winn, H. Richard * 1983; MD, 1968, University of Pennsylvania; physiology of cerebral blood flow regulation.

Associate Professors

Anderson, Gail 1981, (Adjunct); PhD, 1987, University of Washington; clinical pharmacokinetics and epilepsy.

Cohen, Wendy A. 1992; MD, 1975, Harvard University; neuroradiology.

Dalley, Robert W. 1987; MD, 1982, University of Utah; neuroradiology.

Domino, Karen B. 1986, (Adjunct); MA, 1974, University of New Mexico; MD, 1978, University of Michigan; neuroanesthesia.

Eskridge, Joseph M. 1987; MD, 1981, University of Louisville; neuroradiology.

Farwell, Jacqueline R. 1979; MD, 1972, University of California (San Francisco); child neurology, especially epilepsy; neonatal neurology, brain tumors in children.

Goodkin, Robert 1987; MD, 1964, Chicago Medical School; neurological surgery.

Grady, M. Sean 1987; MD, 1981, Georgetown University; traumatic brain and spinal cord injury.

Haynor, David R. 1984, (Adjunct); PhD, 1971, University of California (Berkeley); MD, 1979, Harvard University; neuroradiology, neurosurgery.

Janigro, Damir 1991, (Research); PhD, 1982, University of Milan (Italy); blood brain barrier, glial-neuronal interactions.

Mayberg, Teresa Slee 1983; MD, 1983, University of Washington.

Morrison, Richard S. 1994; PhD, 1982, University of California (Los Angeles); neurobiology and neuro-oncology; growth factors and regulation in brain cell function.

Newell, David W. 1982; MD, 1982, Case Western Reserve University; clinical neurosurgery and neurovascular mechanizing of cerebral ischemia.

Ojemann, Linda M. 1974; MD, 1960, University of Illinois; neurology, treatment of epilepsy.

Phillips, Mark H. 1991; PhD, 1982, University of Wisconsin; medical radiation physics.

Temkin, Nancy R. * 1977; PhD, 1976, State University of New York (Buffalo); clinical trials, recovery models, statistical modeling of epileptic phenomena, survival analysis.

Wilensky, Alan J. 1975; MD, 1967, Western Ontario University (Canada); PhD, 1973, University of Toronto (Canada); neurology, treatment of epilepsy, testing and use of anticonvulsants.

Assistant Professors

Gordon, Ellen L. 1991, (Research); PhD, 1986, University of Massachusetts; adenosine metabolism and cerebrovascular physiology.

Klot, Michel 1990; MD, 1984, Yale University; peripheral nerve injury and diseases, nerve injury/regeneration.

Silber, John R. 1990, (Research); PhD, 1977, University of Florida; DNA repair in human brain, mechanisms of human neurocarcinogenesis.

Stelzer, Keith J. 1990; PhD, 1985, University of Kansas; MD, 1989, University of California (Los Angeles); therapeutic radiology.

Stowbridge, Ben 1994, (Research); PhD, 1991, Yale University; neurophysiology, synaptic function.

Wenzel, Jurgen 1994, (Research); DSc, 1975, Humboldt University (Germany); neuroanatomy and epilepsy research, brain development.

Instructors

Dalley, Andrew T. 1995, (Acting); MD, 1989, Columbia University.

Elliott, John Paul 1994, (Acting); MS, 1984, Stanford University; MD, 1988, Columbia University.

Kim, Do-Kyun Kyle 1996, (Acting); PhD, 1988, MD, 1989, University of Chicago.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Course numbers with a P suffix are not graduate courses and are restricted to medical student enrollment only.

NEUR S 495 Community Rehabilitation of the Neurologically Impaired: Internship (*, max. 5) Fraser, Clemmons Supervised work with a neurologically disabled vocational rehabilitation population within a multidisciplinary vocational rehabilitation unit. Weekly two-hour seminars on vocational rehabilitation issues. Weekly supervision. Prerequisite: three years experience in general population vocational rehabilitation within a private or public sector agency or equivalent. Offered: AWSpS.

NEUR S 498 Undergraduate Thesis (*) Winn Prerequisite: permission of instructor. Offered: AWSpS.

NEUR S 499 Undergraduate Research (*) Winn Investigation of special problems as an intimate member of the research team in the neurological surgery laboratories. Research to lead to a thesis, if desired. List of projects available on request. Prerequisite: permission of instructor. Offered: AWSpS.

NEUR S 505P Preceptorship in Academic Neurosurgery (1). Winn Opportunity for first- and second-year medical students to observe the research, teaching, and patient-care activities of academic neurosurgery. Prerequisite: permission of instructor. Offered: AWSpS.

CONJ 555P Human Oncology for Fourth-Year Medical Students (2) See Conjoint Courses.

NEUR S 680P Neurological Surgery Clerkship (*, max. 8) Grady, Mayberg Student serves clinical clerkship as an intimate member of the staff, participating in inpatient and outpatient care, both preoperative and postoperative, involving neurological surgery patients. University of Washington Medical Center or a University-affiliated hospital may be selected, subject to approval of the department. Prerequisite: HUBIO 563P. (Four weeks.) Offered: AWSpS.

NEUR S 681P Seizure Clinic Clerkship (2.5) A. Wilensky Initial evaluation and follow-up of patients with seizure disorders. Definition of medical and social problems and drug therapy are stressed. Alternate forms of therapy are considered. Linear follow-up of patients. Limited contact with inpatients. Specialized contact with specific neurologic problem and experience in prolonged follow-up and management planning for a chronic disease. Prerequisites: MED 665P and permission of instructor. Offered: AWSpS.

NEUR S 697P Neurological Surgery Special Electives (*, max. 24) Winn By specific arrangement, for qualified students, special clerkship, externship, or research opportunities can be made available at institutions other than the University of Washington. Students wishing to elect this course should obtain from the Dean's office a special assignment form at least one month before preregistration. Prerequisite: permission of instructor. Offered: AWSpS.

Neurology

RR650 University of Washington Medical Center

Neurology, previously a division of the Department of Medicine, became an independent department at the University of Washington School of Medicine in autumn of 1995. The four year residency program (including an internship) has been expanded and offers superb training in all facets of neurology, in a setting of great institutional strength in fundamental neuroscience research. In addition, the Department of Neurology offers exceptional training programs in the Division of Pediatric Neurology and in the Epilepsy Center. A clinical clerkship program provides basic training in neurology patient care. Active programs in teaching, research, and patient care are present at the University of Washington Medical Center, Harborview Medical Center, Children's Hospital and Medical Center, and the Fred Hutchinson Cancer Research Center. Medical students, interns, neurology residents, and postdoctoral research fellows rotate through these various hospitals and participate in the learning experiences offered at each.

Faculty

Chair

Bruce Robert Ransom

Professors

Bird, Thomas D. 1976; MD, 1968, Cornell University; neurology.

Copass, Michael K. 1973; MD, 1964, MA, 1964, Northwestern University; neurology/emergency services.

Crill, Wayne E. * 1967; MD, 1962, University of Washington; properties of cortical neurons.

Farrell, Donald F. 1971; MD, 1965, George Washington University; neurology.

Longstreth, W. T. Jr. 1977; MD, 1975, University of Pennsylvania; MPH, 1982, University of Washington; neurology.

Mills, Richard P. 1978, (Adjunct); MD, 1968, Yale University; glaucoma, neuro-ophthalmology.

Ransom, Bruce Robert * 1995; MD, 1972, PhD, 1972, Washington University; neurology, neuroscience research.

Sarnat, Harvey B. 1992, (Adjunct); MD, 1966, University of Illinois; pediatric neurology, neuromuscular diseases, neurodevelopment.

Schellenberg, Gerald D. 1983, (Research); PhD, 1978, University of California (Riverside); mapping of familial Alzheimer disease genes and cloning of Verner's syndrome gene.

Spence, Alexander M. 1974; MD, 1965, University of Chicago; neurology, neuro-oncology.

Stahl, William L. * 1967; PhD, 1963, University of Pittsburgh; neurochemistry of brain ATPase systems.

Sumi, Shuzo Mark * 1966; MD, 1956, University of Toronto (Canada); neuropathology, neuromuscular disease, neurodegenerative diseases.

Swanson, Phillip D. 1964; MD, 1958, Johns Hopkins University; PhD, 1964, University of London (UK); movement disorders, neurology.

Associate Professors

Donat, Jane F. 1994; MD, 1970, Albert Einstein College of Medicine; pediatric neurology.

Franklin, Gary M. * 1988, (Adjunct Research); MD, 1969, George Washington University; MPH, 1982, University of California (Berkeley); occupational injury, neurological epidemiology, public health nutrition.

Milstein, Jerrold M. 1977, (Adjunct); MD, 1964, University of Minnesota; pediatric neurology.

Spain, William * 1987; MD, 1977, Columbia University; signal transduction in the central nervous system.

Wilensky, Alan J. 1975; MD, 1967, Western Ontario University (Canada); PhD, 1973, University of Toronto (Canada); neurology, treatment of epilepsy, testing and use of anticonvulsants.

Assistant Professors

Fern, Robert 1996, (Acting); PhD, 1992, University College, London (UK); pathology of CNS white matter.

Graf, William D. 1991; MD, 1983, Freie University of Berlin (Germany); congenital defects.

Holmes, Mark D. 1991, (Acting); MD, 1977, Ohio State University; neurology/EEG.

Marra, Christina M. 1988; MS, 1979, Oregon State University; MD, 1984, University of Oregon; neurology, infectious diseases.

Rand, Mark N. 1995, (Acting); PhD, 1992, University of California (Berkeley); ion homeostasis in neurons and glia.

Rho, Jong M. 1995; MD, 1987, University of Cincinnati; pediatric neurology.

Tapscott, Stephen J. 1990; MD, 1982, University of Pennsylvania; neurology, molecular biology.

Instructors

Kraus, Eric E. 1995, (Acting); MD, 1991, University of Minnesota; neurology.

Kutsy, Roman L. 1995, (Acting); MD, 1993, Physico-Technical Institute (USSR); neurology, EEG.

Leverenz, James B. 1992, (Acting); MD, 1985, University of Washington; neurology, psychiatry and behavioral sciences.

Tirschwell, David L. 1995, (Acting); MD, 1991, Cornell University; neurology.

Obstetrics and Gynecology

BB617 Health Sciences

The Department of Obstetrics and Gynecology is involved with teaching, patient care, and research in the areas of normal and abnormal human reproduction: growth and development of the fetus, normal and complicated obstetrics, and surgical and medical diseases of the female reproductive system, including endocrinology, oncology, infectious disease, psychosocial problems, preventive health care, and ethics. The department also provides primary and preventive health care for women.

Faculty

Chair

Steven G. Gabbe

Professors

Benedetti, Thomas J. * 1979; MD, 1973, University of Washington; perinatal medicine.

Bremner, William J. 1980, (Adjunct); MD, 1969, University of Washington; PhD, 1977, Monash (Australia); endocrinology.

Brown, Zane A. * 1977; MD, 1966, Temple University; insulin requiring diabetes complicating pregnancy, genital herpes complicating pregnancy.

Clifton, Donald K. 1981; PhD, 1979, University of California (Los Angeles); reproductive physiology.

Eschenbach, David A. 1976; MD, 1968, University of Wisconsin; gynecology and infectious disease.

Figge, David C. 1956, (Emeritus); MD, 1950, Northwestern University; gynecologic oncology.

Gabbe, Steven G. 1996; MD, 1969, Cornell University Medical College; high risk obstetrics, particularly gestational diabetes.

Greer, Benjamin E. 1980; MD, 1966, University of Pennsylvania; gynecologic oncology.

Knopp, Robert H. * 1974, (Adjunct); MD, 1964, Cornell University; metabolism and endocrinology.

Lein, John N. 1963; MD, 1955, University of Washington; government relations.

Patton, Dorothy L. 1981; PhD, 1981, University of Washington; infectious disease.

Petra, Philip H. * 1966, (Adjunct); PhD, 1966, Tulane University; reproductive biochemistry.

Shy, Kirkwood K. * 1979; MD, 1973, Wayne State University; epidemiologic applications to problems in obstetrics and gynecology.

Soules, Michael R. 1980; MD, 1972, University of California (Los Angeles); reproductive endocrinology.

Spadoni, Leon R. 1960, (Emeritus); MD, 1957, University of Washington; reproductive endocrinology.

Steiner, Robert A. * 1977; PhD, 1975, University of Oregon; neuroendocrinology.

Stenchever, Morton A. 1977; MD, 1956, State University of New York (Buffalo); gynecology, reproductive genetics, medical education.

Tamimi, Hisham K. 1977; MD, 1969, Cairo University (Egypt); gynecologic oncology.

Vontver, Louis A. 1977; MD, 1960, University of Minnesota; MEd, 1970, University of Washington; medical education, gynecology.

Associate Professors

Chu, Joseph * 1982; MD, 1975, Georgetown University.

Easterling, Thomas R. 1985; MD, 1981, University of North Carolina; perinatal medicine.

Koh, Wui-Jin 1984, (Adjunct); MD, 1984, Loma Linda University; therapeutic radiology.

Moore, Donald E. 1977; MD, 1967, Case Western Reserve University; reproductive endocrinology.

Walker, Edward A. 1983; MD, 1983, University of Washington.

Watts, D. Heather 1985; MD, 1981, Jefferson Medical College; perinatal medicine.

Assistant Professors

Battaglia, David 1980; MS, 1978, PhD, 1985, University of Washington; gamete biology.

Cheng, Edith Y. 1987; MS, 1979, Sarah Lawrence College; MD, 1987, University of Washington; genetics.

Fujimoto, Victor Y. 1993; MD, 1986, University of California (San Diego); reproductive neuroendocrinology, physiology of the menstrual cycle.

Goff, Barbara A. 1993; MD, 1986, University of Pennsylvania; gynecologic oncology.

Klein, Nancy A. 1993; MD, 1985, Vanderbilt University; reproductive aging in women, assisted reproductive technology.

Lentz, Gretchen M. 1986; MD, 1986, University of Washington; urogynecology.

Shields, Laurence E. 1993; MD, 1987, University of Texas (San Antonio); perinatal medicine.

Instructors

Kline, Carolyn R. 1994, (Acting); MA, 1984, Harvard University; MD, 1990, Stanford University.

Miller, Leslie R. 1990, (Acting); MD, 1990, University of Washington.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Course numbers with a P suffix are not graduate courses and are restricted to medical student enrollment only.

OB GYN 488 Undergraduate Thesis (*) *Vontver* By arrangement.

OB GYN 499 Undergraduate Research (*) *Vontver* Prerequisite: permission of instructor.

OB GYN 550P Voluntary Pregnancy Termination: An Overview of Medical and Social Issues (2) *Easterling, Miller* A flexible curriculum which allows the medical student to observe in an abortion clinic, read articles and textbook on abortion, and attend a one-day symposium of lectures covering the abortion topics from decision-making to complications. Prerequisite: 665 or equivalent.

OB GYN 579P Obstetric and Gynecologic Investigation (*) *Vontver* The investigation may cover any one of the following fields: toxemias of pregnancy, hormone assays in obstetrics and endocrinology, obstetric and gynecologic oncology, genetics. By arrangement.

OB GYN 665P Introduction to Obstetrics and Gynecology, UH-HMC (*, max. 12) *Vontver* Introductory clerkship providing comprehensive medical care and counseling to female patients. Includes management and delivery of obstetrical patients, diagnosis and management of gynecologic diseases, hospital rounds, outpatient clinics, seminars, tutorial, and community health-care agencies for women. Rotation between UWMC and Harborview Medical Center. Prerequisite: HUBIO 565P. (Six weeks. Limit: six students.)

OB GYN 668P Introduction to Obstetrics and Gynecology, Boise (*, max. 12) *Vontver* Clerkship equivalent to 665P offered at Boise, Idaho (WAMI). Includes experience in several private physician offices. Prerequisite: HUBIO 565P. (Six weeks. Limit: two students.)

OB GYN 667P Introduction to Obstetrics and Gynecology, Madigan (*, max. 12) *Vontver* Clerkship equivalent to 665P offered at Madigan Army Medical Center, Tacoma. Not offered Summer Quarter. Prerequisite: HUBIO 565P. (Six weeks. Limit: five students.)

OB GYN 668P Introduction to Obstetrics and Gynecology, Spokane (12) *Vontver* Clerkship equivalent to 665P offered at Spokane (WAMI). Includes experience in several private physicians' offices. Prerequisite: HUBIO 565P. (Six weeks. Limit: three students.)

OB GYN 669P Introduction to Obstetrics and Gynecology, Swedish (12) *Vontver* Clerkship equivalent to 665P offered at Swedish Hospital Medical Center. Prerequisite: HUBIO 565P. (Six weeks. Limit: two students.) Not offered summer quarter.

OB GYN 670P Introduction to Obstetrics and Gynecology, GH-Central (12) *Vontver* Clerkship equivalent to 665P offered at the Central facility of Group Health Cooperative of Puget Sound in Seattle. Students spend time in delivery room, surgery, and clinic, and have a specific preceptor assigned. Prerequisite: HUBIO 565P. (Six weeks. Limit: two students.)

OB GYN 671P Introduction to Obstetrics and Gynecology, Anchorage (12) *Vontver* Clerkship

equivalent to 665P offered at Anchorage, Alaska (WAMI). Includes experience in several private physicians' offices as well as Providence Hospital and Elmendorf Air Force Base. Prerequisite: HUBIO 565P. (Six weeks. Limit: three students.)

OB GYN 672P Introduction to Obstetrics and Gynecology, GH-East (12) *Vontver* Clerkship equivalent to 665P offered at the Eastside facility of Group Health Cooperative of Puget Sound in Redmond. Students spend time in delivery room, surgery, and clinic, and have a specific preceptor assigned. Prerequisite: HUBIO 565P. (Six weeks. Limit: one student.)

OB GYN 673P Introduction to Obstetrics and Gynecology, Military, Madigan (12) *Vontver* Clerkship equivalent to 665P offered at Madigan Army Medical Center. Students spend time in delivery room, surgery, and clinic, and have a specific preceptor assigned. Prerequisite: HUBIO 565P. (Six weeks. Limit: two students.)

OB GYN 674P Introduction to Obstetrics and Gynecology, Tacoma (12) *Vontver* Clerkship equivalent to 665P offered at Tacoma General Hospital. Prerequisite: HUBIO 465P. (Six weeks. Limit: one student.)

OB GYN 681P Gynecological Oncology Subspecialty (8) *Vontver* Experience in reproductive tract malignancy, chemotherapy, and radiation therapy. Student follows selected patients through primary surgery, recovery, and initial adjuvant treatment, as well as continuing treatment in both clinic and inpatient settings. Prerequisite: basic OB GYN Clerkship. (Limit: two students each four weeks.)

OB GYN 682P Antenatal High-Risk Obstetrics (8) *Vontver* Four weeks on high-risk antenatal obstetrics ward and clinic. Students responsible for initial workups, daily laboratory evaluations, continuing care of high-risk antepartum patients. Weekly conference with obstetrics attending; presentation of one or more topics per rotation. Excellent coordination with resident and attending staff required to maintain patient-care continuity. (Limit: two students each four weeks.)

OB GYN 684P Endocrinology of Reproduction (*, max. 12) *Vontver* The biochemistry of steroids. Steroid metabolism as related to clinical problems. Diagnosis and treatment of endocrine disorders. Case studies with special emphasis on modern methods of investigation and assisted reproductive technology. (Limit: one student each four weeks.)

OB GYN 685P Obstetrics/Gynecology Preceptorship (*, max. 8) *Vontver* Close working relationship with physician in private practice of obstetrics and gynecology, including: hospital rounds, surgery, deliveries, and office and business aspects of private practice as individually arranged. Forty hours minimum can be arranged to fit schedule not to exceed 8 credits. Prerequisites: 665P or equivalent and permission of instructor. (Limit: two students.)

OB GYN 697P Obstetrics and Gynecology Special Electives (*, max. 24) *Vontver* By arrangement, for qualified students, special clerkship or research opportunities can sometimes be made available at other institutions. Students wishing this course should obtain special assignment form one month before preregistration. Department evaluates student performance. Prerequisite: permission of instructor.

OB GYN 698P Introduction to Obstetrics and Gynecology, Away (*, max. 12) *Vontver* Clerkship equivalent to 665P, at sites outside the UW/WAMI system (currently includes Everett, Missoula, and Virginia Mason). By arrangement. A special assignment form must be obtained one month in advance of preregistration. Subject to Dean's Office approval. Department evaluates student performance. Prerequisites: HUBIO 565P; permission of instructor.

Ophthalmology

RR801 University of Washington Medical Center

The Department of Ophthalmology is responsible for the instructional and research programs in diseases of the eye and its adnexae as well as the visual system.

Medical student instruction is provided at all levels, including multiple electives in the clinical years. Graduate physicians are provided with three or four years of residency training at the affiliated hospitals. Post-residency fellowships are offered in the subspecialties of ophthalmology. Patient care is provided under the supervision of full- and part-time faculty physicians at University of Washington Medical Center, Harborview Medical Center, Pacific Medical Center, Veterans Affairs Medical Center, and Children's Hospital and Medical Center.

Clinical research programs relate to eye diseases. Laboratory research encompasses neurophysiology of vision, morphology of the retina and visual system, and biochemistry of ocular tissues. Postdoctoral training is offered in all these disciplines.

Faculty

Chair

Robert E. Kalina

Professors

Clark, John I. 1982, (Adjunct); PhD, 1974, University of Washington; structural and developmental basis of lens-cell transparency and cataract formation.

Hendrickson, Anita E. * 1969; PhD, 1964, University of Washington; neuroanatomy, morphology and development of primate retina.

Kalina, Robert E. 1967; MD, 1960, University of Minnesota; vitreoretinal diseases.

Kinyoun, James L. 1978; MD, 1971, University of Nebraska; vitreoretinal diseases.

Lindquist, Thomas D. 1987; PhD, 1978, MD, 1981, University of Medicine & Dentistry of New Jersey; corneal and external disease.

Milam, Ann H. 1971; PhD, 1967, University of Texas, Southwestern; electron microscopy, ophthalmic pathology, retinitis pigmentosa, retinal cell biology.

Mills, Richard P. 1978; MD, 1968, Yale University; glaucoma, neuro-ophthalmology.

Orcutt, James C. 1982; PhD, 1976, MD, 1977, University of Colorado (Denver); orbit, oculoplastics, neuro-ophthalmology.

Pagon, Roberta A. 1975, (Adjunct); MD, 1972, Harvard University; medical genetics.

Patton, Dorothy L. 1981, (Adjunct); PhD, 1981, University of Washington; infectious disease.

Rodiek, Robert W. 1978; MS, 1961, Massachusetts Institute of Technology; PhD, 1965, University of Sydney (Australia); neurophysiology and visual neurobiology.

Saari, John C. * 1974; PhD, 1970, University of Washington; retinal biochemistry.

Associate Professors

Barlow, William E. * 1989, (Adjunct Research); MS, 1982, PhD, 1986, University of Washington; survival analysis, residuals, and evaluation of screening programs.

Chuang, Elaine L. 1993; MD, 1979, University of Texas (San Antonio); vitreoretinal diseases, ocular inflammation.

Fritsche, Thomas R. * 1984, (Adjunct); MD, 1981, PhD, 1984, University of Minnesota; systematics and ecology of animal parasites; medical microbiology.

Palczewski, Krzysztof * 1992; MS, 1980, PhD, 1986, Technical University of Wrocław (Poland); visual transduction.

Weiss, Avery H. 1991; MD, 1974, Miami University (Ohio); pediatric ophthalmology, strabismus.

Instructor

Kaplan, Howard J. 1994, (Acting); MD, 1990, New York University.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Course numbers with a P suffix are not graduate courses and are restricted to medical student enrollment only.

OPHTH 488 Undergraduate Thesis (*) *Kinyoun (University of Washington Medical Center)* Thesis-based research in vision and ophthalmology. Elective. Prerequisite: permission of instructor. (Limit: two students.) Offered: AWSpS.

OPHTH 498 Undergraduate Research (*) *Kinyoun (University of Washington Medical Center)* Laboratory or clinical research in morphology, biochemistry, immunology, experimental pathology, or clinical studies of the eye and visual system. Prerequisite: permission of instructor. (Limit: two students.) Offered: AWSpS.

OPHTH 501P Ophthalmology Preceptorship (1) *Kinyoun* Individualized experiences with one or more of the full-time faculty members of the department covering research, teaching, and patient care. Student observes activities in the clinic, hospital ward, operating room, and research laboratories. Prerequisites: first- and second-year medical student standing and permission of instructor. Offered: AWSpS.

OPHTH 681P Ophthalmology Clerkship (4) *Mills (Harborview Medical Center)* Students gain experience in the diagnosis and treatment of common ocular disorders. Basic examination techniques, including tonometry, ophthalmoscopy, and biomicroscopy. Students work with an eye pathologist in gross and microscopic examination of surgical and autopsy eyes. Prerequisite: completion of human biology series. (Limit: one student.) Offered: AWSpS.

OPHTH 682P Ophthalmology Clerkship (4) *Choy (Pacific Medical Center)* Student works with a faculty member in the diagnosis and treatment of ocular diseases in both outpatient and inpatient populations. Experience in common ocular disorders is gained, and neurological and other consultations seen. Prerequisite: completion of human biology series. (Limit: one student.) Offered: AWSpS.

OPHTH 683P Pediatric Ophthalmology Clerkship (4) *Weiss (Children's Hospital and Medical Center)* Student examines and observes treatment of children with ocular diseases and learns to differentiate trivial from potentially blinding disorders. Programmed text in general ophthalmology furnished. Prerequisite: University of Washington student and completion of human biology series. (Two weeks, full-time. Limit: one student.) Offered: WS.

OPHTH 685P Ophthalmology Clerkship (4) *Orcutt (VA Puget Sound Health Care System)* Participation in diagnosis and treatment of medical and surgical ocular disease. Outpatient examinations, inpatient surgery, and neuro-ophthalmologic, retinal, and medical consultations. Basic techniques involved in tonometry, ophthalmoscopy, and biomicroscopy of eye. Prerequisite: completion of human biology series. (Limit: one student.) Offered: AWSpS.

OPHTH 686P Ophthalmology Clerkship (4) *Gorman (Group Health Hospital)* Diagnosis and treatment of ocular diseases in outpatients. Weekly assignment to Group Health ophthalmologist responsible for the care of walk-in and urgent patients, which may demonstrate findings pertinent to the future practice of primary-care physicians. Examination techniques, including tonometry, ophthalmoscopy, and biomicroscopy. Prerequisite: completion of human biology series. (Limit: one student.) Offered: AWSp.

OPHTH 687P Ophthalmology Clerkship (4) *Kinyoun (University of Washington Medical Center)* Inpatient and outpatient diagnosis and treatment of eye diseases. Subspecialty clinics include cornea, retina, neuro-ophthalmology, glaucoma, contact lenses, and strabismus. Student attends regularly scheduled conferences in ophthalmic basic and clinical science. Prerequisite: completion of human biology series. (Limit: one student.) Offered: AWSpS.

OPHTH 688P Ophthalmology Clerkship (8) *Kinyoun, Werner* Four-week externship at Alaska Native Medical Center in Anchorage. Opportunity to learn and practice common eye examination techniques, including slit-lamp biomicroscopy, tonometry, and funduscopy. Patients seen three days a week; two days spent in the operating room. Prerequisites: completion of human biology series, fourth-year medical students only. Offered: AWSpS.

OPHTH 689P Ophthalmology Special Electives (*, max. 24) *Kinyoun* By specific arrangement, for qualified students, special clerkship, externship, or research opportunities can at times be made available at other institutions. Students wishing to elect this course should obtain from the Dean's office a special assignment form at least one month before preregistration. Prerequisite: permission of instructor. Offered: AWSpS.

Orthopaedics

BB1043 University of Washington Medical Center

The Department of Orthopaedics is actively involved in quality patient care, teaching, and research concerning bone and joint problems. Special areas of expertise include foot and ankle, hand and microvascular, hip and knee, arthritis, sports medicine, pediatric orthopaedics, shoulder and elbow, spine, trauma, and tumors.

In addition to providing instruction for medical students, the department provides education at the graduate, residency, and post-residency levels. Selected medical students may elect research experience in the department. A fully approved residency offers opportunities to carry out fundamental and clinical research. Residents may work toward the Master of Science degree by meeting the requirements of the Graduate School and the academic unit offering the degree program.

Faculty

Chair

Frederick A. Matsen

Professors

Bigos, Stanley J. 1981; MD, 1975, University of Missouri; orthopaedics, spine.

Chesnut, Charles * 1974, (Adjunct); MD, 1966, University of Florida; nuclear medicine.

Eyre, David R. * 1985; PhD, 1969, University of Leeds (UK); connective tissue biology, collagen chemistry, bone and cartilage metabolism.

Hansen, Sigvard T. 1968; MD, 1961, University of Washington; orthopaedics, foot, ankle and amputations.

Matsen, Frederick A. * 1973; MD, 1968, Baylor University; orthopaedics, bone and joint research, robotics.

Olerud, John E. 1977; MD, 1971, University of Washington; dermatology.

Sandell, Linda J. * 1987; PhD, 1980, Northwestern University; biochemistry and molecular biology of connective tissue, extracellular matrix molecules.

Simkin, Peter A. 1968, (Adjunct); MD, 1961, University of Pennsylvania; rheumatology.

Smith, Nathan J. * 1965, (Emeritus); MD, 1945, University of Wisconsin; sports medicine.

Staheili, Lynn T. 1975, (Emeritus); MD, 1959, University of Utah; pediatric orthopaedics.

Swionkowski, Marc F. 1988; MD, 1979, University of Southern California; orthopaedics, traumatology.

Associate Professors

Benirschke, Stephen K. 1985; MD, 1979, Case Western Reserve University; traumatology.

Clark, John M. Jr. 1982; PhD, 1975, MD, 1976, University of Chicago; orthopaedics, hip and knee arthritis.

Conrad, Ernest U. 1986; MD, 1979, University of Virginia; orthopaedics, tumors and bone transplantation.

Gardner, Gregory C. 1989, (Adjunct); MD, 1984, Baylor University; rheumatology.

Gillespy, Thurman 1990, (Adjunct); MD, 1980, Thomas Jefferson University; musculoskeletal radiology, orthopaedics.

Graney, Daniel O. * 1966, (Adjunct); PhD, 1965, University of California (San Francisco); gross anatomy, clinical anatomy, computers in teaching.

Greenlee, Theodore K. 1971; MD, 1959, Northwestern University; general orthopaedics.

Hanel, Douglas Paul 1992; MD, 1977, St Louis University; orthopaedics, hand/microvascular surgery.

Harryman, Douglas T. 1988; MD, 1979, Virginia Commonwealth University; orthopaedics, shoulder and elbow.

Henley, Michael Bradford 1988; MD, 1979, University of Washington; orthopaedics, spine trauma and reconstruction.

Larson, Roger V. 1982; MD, 1973, University of Utah; orthopaedics, arthroscopy, sports medicine and knee ligament reconstruction.

Mann, Frederick A. 1993, (Adjunct); MD, 1975, Indiana University; emergency radiology.

Mosca, Vincent S. 1985; MD, 1978, University of Rochester; pediatric orthopaedics.

Ott Ralph, Susan M. 1980, (Adjunct); MD, 1974, University of Washington; nephrology.

Raskind, Wendy H. 1981, (Adjunct); PhD, 1977, MD, 1978, University of Washington; medical genetics.

Richardson, Michael L. 1984, (Adjunct); MD, 1975, Baylor University; bone and joint radiology and musculoskeletal.

Routt, Milton L. 1988; MD, 1983, University of Texas (Galveston); orthopaedics, traumatology.

Sangeorzan, Bruce J. 1986; MD, 1981, Wayne State University; orthopaedics, foot, ankle and amputations.

Schoene, Robert B. 1977, (Adjunct); MD, 1972, Columbia University; respiratory diseases.

Sidles, John Arthur 1984; PhD, 1983, University of Washington.

Smith, Douglas G. 1989; MD, 1984, University of Chicago; orthopaedics, foot, ankle and amputations.

Teitz, Carol Claire 1974; MD, 1974, Yale University; orthopaedics, arthroscopy, sports medicine and knee ligament reconstruction.

Tencer, Allan Fred * 1988; PhD, 1981, McGill University (Canada).

Trumble, Thomas E. 1989; MD, 1979, Yale University; orthopaedics, hand and microvascular surgery.

Vedder, Nicholas 1990; MD, 1981, Case Western Reserve University; case history, plastic and reconstructive surgery.

Wilson, Anthony J. 1994, (Adjunct); MBChB, 1972, Otago University (New Zealand); orthopaedic trauma imaging, teleradiology, digital radiography, MRI/CT.

Assistant Professors

Belza, Basia * 1991, (Adjunct); MN, 1982, University of Virginia; PhD, 1991, University of California (San Francisco); chronic illness, gerontology, fatigue prevention and management in rheumatic diseases.

Bruckner, James 1990; MD, 1984, Creighton University; orthopaedics, tumors and bone transplantation.

Chansky, Howard Alan 1992; MD, 1987, University of Pennsylvania; orthopaedics, general.

Chapman, Jens R. 1990; MD, 1983, Technical University of Munich (Germany); orthopaedics, spine trauma/reconstruction.

Hunter, John C. 1992, (Adjunct); MD, 1970, University of Illinois; musculoskeletal.

Mirza, Sohail K. 1989; MD, 1989, University of Colorado (Denver); spinal surgery/spine biomechanics.

Song, Kit M. 1995; MD, 1985, University of Iowa; pediatric orthopaedics.

Instructors

Clark, Carey A. 1995, (Acting); MD, 1990, University of Tennessee.

Coetzee, Johannes C. 1995, (Acting); MBChB, 1984, University of Pretoria (South Africa).

Desai, Bharat M. 1995, (Acting); MD, 1990, Temple University.

Finkelstein, Joel A. 1995, (Acting); MD, 1988, University of Toronto (Canada).

Hebert, Christopher K. 1995, (Acting); MD, 1990, Tulane University.

Krieg, James C. 1995, (Acting); MD, 1990, University of Medicine & Dentistry Of New Jersey.

O'Donnell, Richard J. 1995, (Acting); MD, 1989, Harvard University.

Smith, Kevin L. 1995, (Acting); MD, 1990, Southern Illinois University.

Thomson, Gregory J. 1995, (Acting); MD, 1990, Wayne State University.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Course numbers with a P suffix are not graduate courses and are restricted to medical student enrollment only.

ORTHP 435 Spine Resource Clinic Elective (2) A four-week course examining musculoskeletal pathology of spine. Introduction to physical and non-physical problems that can block patient's response to treatment and complicate care, outcome. Promotes understanding of role of helping patients identify, act upon options. Prerequisites: physical and occupational therapy students, physician assistants, nurses with at least two years undergraduate work.

ORTHP 494 Athletic Health Care (*, max. 3) *Rice* Prevention and management of athletic injuries. Basic course for coaches, school nurses, medical students. Responsibilities/liability, preseason screening/prevention techniques, conditioning, equipment nutrition, safety, preparedness, injury recognition, emergency procedures, common injuries, record keeping, communication, athletic health care organization. Laboratories, taping, stretching, athletic first-aid, use of ice. Prerequisite: permission of instructor.

ORTHP 495 Athletic Health Care Administration (3) Organizational management of athletic health-care aspects of operating organized athletic programs. For health professionals, school or community-based administrators/athletic directors/coaches, university-based health educators. Overview; generating awareness; needs assessment; educating coaches, student trainers; establishing central training room; standardization of procedures; record keeping; evaluation. Prerequisite: 494 or permission of instructor.

ORTHP 496 Advanced Athletic Health Care (3) Advanced sports medicine course on the prevention and management of athletic injuries. For coaches, school nurses, medical students. Problem-solving and hands-on approach emphasize wellness, conditioning, skills of injury evaluation, steps to recovery through rehabilitation, taping techniques, emergency first aid procedures. Prerequisite: 494 or permission of instructor.

ORTHP 498 Undergraduate Thesis (*) *Eyre* Student works directly with a preceptor in selecting a suitable area for laboratory or clinical research in the area of orthopaedics, and develops a thesis for recognition. Prerequisites: HUBIO 553P and permission of faculty mentor. (Twelve weeks.) Offered: AWSpS.

ORTHP 499 Undergraduate Research (*) *Eyre* Investigation of pertinent musculoskeletal problems in the orthopaedic laboratories as part of the research group. Prerequisite: permission of faculty mentor. (Twelve weeks.) Offered: AWSpS.

ORTHP 505P Preceptorship in Orthopaedic Surgery (1) Opportunity for first- and second-year medical students to gain experience with clinical faculty members in the community. Students observe general aspects of private practice from a longitudinal perspective. Prerequisite: permission of department. Offered: AWSpS.

ORTHP 585P Sports Medicine (2) *Teitz* Lectures, patient problem presentations, and seminar discussions to explore impact of exercise and sport participation on various body systems. Includes nutritional concerns, biomechanics of certain sports injuries and cardiovascular, pulmonary, and musculoskeletal concerns. Prerequisite: second-year medical student standing. Offered: Sp.

ORTHP 675P Preceptorship in Orthopaedics (*, max. 4) *Larson* Student spends full time with the preceptor during all his or her working day in order to gain a better understanding of the diagnosis and the management of problems of the musculoskeletal system as seen in the private orthopaedic practice. Prerequisites: SURG 665P or HUBIO 553P and permission of department. (Two weeks, full-time.) Offered: AWSpS.

ORTHP 676P Pediatric Orthopaedics (*, max. 8) *Mosca, Song, Staheli* Acquaints students with all aspects of musculoskeletal problems in childhood. Didactic conferences and seminars, and opportunities for active participation in both inpatient and outpatient care at Children's Hospital and Medical Center, and correlative anatomy and pathology. Prerequisite: SURG 665P or HUBIO 553P. (Four weeks, full-time.) Offered: AWSpS.

ORTHP 677P Musculoskeletal Trauma (*, max. 8) *Banirschke, Chapman, Hanel, Hansen, Henley, Roult, Sengcozan, Smith, Swionkowski* Harborview Medical Center. Emergency room, wards, operating room,

and outpatient clinics. Instruction in general and special clinics, including hand, hip, foot, and fracture, with emphasis placed on physical examination of the patient. Students take correlative anatomy and pathology. Prerequisites: SURG 665P, HUBIO 553P. (Four weeks, full-time.) Offered: AWSpS.

ORTHP 678P Musculoskeletal Oncology (8/12) *Conrad* In-depth experience on musculoskeletal oncology service with primary involvement in initial evaluation, staging, treatment, and postoperative follow-up of patients with various musculoskeletal malignancies. Elective involves experience in surgical, oncologic, radiologic, and pathologic principles of managing sarcomas. Prerequisite: basic orthopaedic elective or permission of instructor. Offered: AWSpS.

ORTHP 680P General Orthopaedic Clerkship (*, max. 8) *Veteran's Administration Hospital*: structured to provide a basic education in the fundamentals of the musculoskeletal system. Heavy emphasis is placed on the reconstructive alternatives in the treatment of degenerative joint diseases. Prerequisite: completion of HUBIO series; third- and fourth-year students. Enrollment limited to three. Offered: AWSpS.

ORTHP 681P University of Washington Medical Center Orthopaedics (8) *Bigos, Bruckner, Clark, Conrad, Harryman, Larson, Matsen, Mirza, Teitz, Trumble* Orthopaedic subspecialty clerkship at University of Washington Medical Center. Preceptor-based outpatient, inpatient, emergency, or operative orthopaedic care. Students work primarily in one subspecialty area and in one general orthopaedic clinic. For students who plan careers in orthopaedic surgery. Prerequisites: completion of HUBIO series, third- and fourth-year medical students. Offered: AWSpS.

ORTHP 682P Outpatient Orthopaedics (8) Outpatient orthopaedic experience at University of Washington Medical Center. Emphasis on physical exam, diagnosis, radiographic evaluation, and non-operative treatment. Rotation through general orthopaedics as well as all subspecialty areas. For students who plan careers in primary care. Prerequisite: completion of HUBIO series. Offered: AWSpS.

ORTHP 685P Spine Resource Clinic Elective (2) *Bigos* Four-week part-time clerkship examining musculoskeletal pathology of the spine. Introduction to physical and non-physical problems that can block the patient's response to treatment and complicate care and outcome. Promotes understanding of the role of helping patients identify and act upon options. Prerequisite: any level medical student. Offered: AWSpS.

ORTHP 687P Orthopaedic External Elective (*, max. 12) *Larson* Special arrangements can be made for students desiring to take orthopaedic electives at other institutions. Programs generally approved include orthopaedic clerkships at other universities or at large orthopaedic institutes. Prerequisites: HUBIO 553P and permission of department. Offered: AWSpS.

Otolaryngology—Head and Neck Surgery

BB1165 University of Washington Medical Center

The Department of Otolaryngology—Head and Neck Surgery provides clinical care for patients with a broad spectrum of disorders affecting the head and neck region, including the ears, nose, and throat. A major portion of departmental effort is directed toward basic research in the areas of sensorineural hearing disorders, physiology of the larynx, and cancer treatment and rehabilitation. The department supports a number of research fellows and advanced degree candidates, and is responsible for a four-year residency program

and for the training of medical students in subjects relevant to the specialty.

Faculty

Chair

Ernest A. Weymuller, Jr.

Professors

Donaldson, James A. 1965, (Emeritus); MD, 1954, University of Minnesota; otology.

Duckert, Larry Gene 1978; MD, 1972, PhD, 1977, University of Minnesota; otology/neurotology.

Gates, George A. 1993; MD, 1959, University of Michigan; otology/neurotology, cochlear implantation.

Kuhl, Patricia K. * 1976, (Adjunct); MA, 1971, PhD, 1973, University of Minnesota; speech perception.

Mayberg, Marc R. 1985, (Adjunct); MD, 1978, Mayo Medical School/graduate School; cerebrovascular disease, vasospasms, ultrastructure of cerebral arteries.

Orcutt, James C. 1982, (Adjunct); PhD, 1976, MD, 1977, University of Colorado (Denver); orbit, oculoplastics, neuro-ophthalmology.

Rubel, Edwin W. * 1986; PhD, 1969, Michigan State University; developmental neurobiology, with special emphasis on vertebrate auditory system development.

Snyder, Jack 1969, (Emeritus); MA, 1956, PhD, 1971, University of Washington; audiology.

Spelman, Francis A. * 1961, (Adjunct); PhD, 1975, University of Washington; biophysics of implanted cochlea, bioinstrumentation for primate research.

Stanley, Robert B. 1993; MD, 1976, Duke University; otolaryngology/head and neck surgery, trauma, maxillofacial surgery.

Weymuller, Ernest A. Jr. 1978; MD, 1966, Harvard University; otolaryngology/head and neck surgery.

Associate Professors

Coltrera, Marc Dante 1986; MD, 1981, Yale University; otolaryngology/head and neck surgery.

Hillel, Allen D. * 1983; MD, 1976, Stanford University; peripheral nerve physiology after injury, swallowing disorders in neuromuscular disease.

Inglis, Andrew F. Jr. 1983; MD, 1981, Medical College of Pennsylvania; pediatric otolaryngology/head and neck surgery.

Lippe, William R. 1988, (Research); PhD, 1972, University of California (Irvine); neurobiology.

Makielski, Kathleen H. 1985; MD, 1978, University of Michigan; otolaryngology/head and neck surgery.

Manning, Scott C. 1995; MD, 1980, Tulane University; pediatric otolaryngology/head and neck surgery.

Murakami, Craig S. 1989; MD, 1983, University of Washington; facial cosmetic and reconstructive surgery.

Norton, Susan J. * 1991; PhD, 1982, University of Washington; normal and non-normal hearing, specifically cochlear mechanics, in humans and animals.

Rees, Thomas 1971; MA, 1969, University of Redlands; PhD, 1972, University of Washington; audiology.

Robinson, Lawrence R. * 1989, (Adjunct); MD, 1982, Baylor University; psychiatry.

Schubert, Mark M. * 1974, (Adjunct); DDS, 1974, MSD, 1981, University of Washington; oral medicine/oral oncology.

Tempel, Bruce L. * 1988; PhD, 1983, Princeton University; molecular neurobiology/neurogenetics, especially potassium channel gene structure and function.

Werner, Lynne A. * 1986, (Adjunct); PhD, 1980, Loyola University (Chicago); auditory development, infant psychoacoustics.

Assistant Professors

Calderon, Rosemary 1987, (Adjunct); PhD, 1988, University of Washington.

Feeney, Martin P. 1986; MA, 1979, Washington State University; PhD, 1993, University of Washington; audiology.

Futran, Neal David 1995; DMD, 1982, University of Pennsylvania; MD, 1987, State University of New York (Downstate Medical Center); oral maxillofacial surgery.

Pinczower, Eric F. 1991; MD, 1986, University of California (Irvine); otolaryngology/head and neck surgery, facial reconstructive surgery.

Sie, Kathleen C. Y. 1984; MD, 1984, University of Michigan; pediatric otolaryngology/head and neck surgery.

Instructor

Stack, Brendan C. 1995, (Acting); MD, 1989, Eastern Virginia Medical School; otolaryngology/head and neck surgery.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses numbered with a P suffix are not graduate courses and are restricted to medical student enrollment only.

OTOHN 488 Undergraduate Thesis (*) Rubel, Weymuller Student works directly with department faculty in selecting a suitable area for laboratory or clinical research in the area of otolaryngology, and develops a thesis for recognition. Prerequisite: permission of instructor. Offered: AWSpS.

OTOHN 489 Undergraduate Research (*) Rubel, Weymuller Research opportunities offered under direction in the area of otolaryngology. (Twelve weeks.) Offered: AWSpS.

OTOHN 680P Introduction to Clinical Otolaryngology—Head and Neck Surgery (4/8, max. 24) Hillel, Makielski, Manning, Stanley, Weymuller Introduction to surgical subspecialty of otolaryngology—head and neck surgery. Structured to allow broad introduction to breadth of specialty. Students see patients in clinic, join inpatient rounds, have opportunity to go to operating room. Rotations at UWMC, VAH, HMC, CHMC, PMC/PRV. Prerequisite: human biology series. Recommended: MED 665 or SURG 665. Offered: AWSpS.

OTOHN 683P Otolaryngology—Head and Neck Surgery Externship (*, max. 8) (Madigan Army Medical Center) Individual externship training at outpatient clinic, where visits average twelve hundred per month, supplemented by inpatient assignments. Students may reside at the hospital during externship, using facilities of bachelor officer quarters and hospital mess. Prerequisite: completion of human biology series. (Two or four weeks, full-time.) Recommended: MED or SURG 665. Offered: AWSpS.

OTOHN 686P Otolaryngology—Head and Neck Surgery: Medical and Surgical Aspects (*, max. 12) Weymuller Clinical in-depth study for the student whose interest lies in pathology of the head and neck. Reasonable flexibility to arrange course content that provides exposure to all aspects of patient care. Prerequisite: permission of chairman. Recommended: MED or SURG 665. Offered: AWSpS.

OTOHN 697P Otolaryngology—Head and Neck Surgery Special Electives (*, max. 24) Weymuller By specific arrangement. Special clerkship, extern-

ship, or research opportunities can at times be made available at institutions other than the University of Washington. Students wishing to elect this course should obtain from the Dean's office a special assignment form at least one month before preregistration. Prerequisite: permission of chairman. Offered: AWSpS.

Pathology

C516 Health Sciences

Pathology is both a basic biological science and a specialty of medicine. As a basic science, it deals with the natural history and mechanisms of initiation and expression of disease processes. In its broadest sense, the study of disease encompasses the entire animal and plant kingdoms. The interests of the department focus on diseases of vertebrates, especially of man. The principal aim of the pathologist is to understand disease manifestations and processes in whatever terms are required. Therefore, the techniques of the pathologist range from those of the physicist and physical chemist through those of the physiologist to the realm of the epidemiologist. Present emphasis in the department is on cellular and molecular pathology, environmental pathology, and analysis of disease by methods of cell and molecular biology, recombinant DNA techniques, light and electron microscopy, histochemistry and cytochemistry, analytical biochemistry, cell and organ culture, and immunology.

Graduate Program

Daniel Bowen-Pope, Graduate Program Coordinator

The Department of Pathology offers graduate training in experimental pathology, with an emphasis on the cellular and molecular biological basis of disease, leading to the Doctor of Philosophy degree in experimental pathology. The aim of the graduate program is to train individuals for a career in the scientific investigation of basic disease mechanisms. The program encompasses students and faculty members with diverse interests, which range from investigation of specific disease conditions to the molecular basis of alterations in cell function and of gene expression. Faculty members' interests include the normal and pathological aspects of cardiovascular biology, tumor biology, environmental effects on normal processes, biology of aging, neurobiology, immune response, inflammation and repair, immunopathology and biology of extracellular matrix, as well as fundamental processes that underlie disease, such as regulation of gene expression and protein synthesis, structure and function of oncogenes, viral and nonviral transformation, chromatin structure, mutagenesis and DNA repair, and genetic recombination. The department's graduate faculty comprises 40 members, who are located at the Health Sciences Center, Veterans Affairs Medical Center, Harborview Medical Center, Children's Hospital and Medical Center, and Fred Hutchinson Cancer Research Center. Approximately 30 full-time students are pursuing the Ph.D. degree.

Students in the program are expected to fulfill course work requirements during the first two years. In line with the diversity of faculty members' interests within the department, course requirements are kept to a minimum to provide students with maximum flexibility.

Special Requirements

Prospective candidates are expected to have had undergraduate experience in biology, physics, chemistry, and mathematics and acceptable scores on the Graduate Record Examination, including advanced biology or chemistry. Those wishing to matriculate toward both the M.D. and Ph.D. degrees must gain admission to both the Graduate School and the School of Medicine.

Financial Aid

Funding for students is provided from departmental and University funds, training grants, a variety of institutional fellowships, and research grants of individual faculty members.

Research Facilities

The department emphasizes the cellular and molecular approach to the investigation of the pathogenesis of disease in mammalian species. Special facilities exist for training in electron microscopy; cell, tissue, and organ culture; recombinant DNA techniques; histochemistry and cytochemistry; analytical biochemistry; immunology; and molecular and cell biology.

Correspondence and Information

Graduate Program Coordinator
Department of Pathology, Box 357470

Residency Training Program

The department supervises an internship and residency training program in anatomic pathology and, jointly with the Department of Laboratory Medicine, in clinical pathology for qualified medical doctors. Persons who complete the residency program are eligible for certification by the American Board of Pathology. Lawrence D. True is the program director.

Correspondence and Information

Resident Program Director
Department of Pathology, Box 356100

Faculty

Chair

Nelson Fausto

Professors

Albers, John J. * 1971, (Adjunct Research); MS, 1967, PhD, 1969, University of Illinois; lipoprotein metabolism and pathophysiology.

Alvord, Ellsworth C. * 1960; MD, 1946, Cornell University; neuropathology, experimental allergic encephalitis, multiple sclerosis, brain tumors.

Benditt, Earl P. * 1957, (Emeritus); MD, 1941, Harvard University; atherosclerosis, diabetes mellitus, amyloidosis.

Benjamin, Denis R. * 1975; MChB, 1968, University of Witwatersrand (South Africa); pediatric pathology, hematopathology nutrition, circadian rhythms.

Bowen-Pope, Daniel * 1979; PhD, 1979, University of California (Berkeley); gene regulation, growth factors and receptors.

Brawer, Michael K. 1989, (Adjunct); MD, 1980, University of California (Los Angeles); benign and malignant prostate proliferative disorders.

Byers, Peter H. * 1976; MD, 1969, Case Western Reserve University; extracellular matrix synthesis, genetic disorders of collagen metabolism, secretion.

Chi, Emil Y. * 1972, (Research); PhD, 1973, University of California (Santa Barbara); lung structures and function, mast cell secretion and inflammation.

Clowes, Alexander W. 1980, (Adjunct); MD, 1972, Harvard University; general and vascular surgery.

Collins, Steven J. 1980, (Adjunct); MD, 1973, Columbia University; oncology.

Cowan, Marie J. * 1977, (Adjunct); MS, 1972, PhD, 1979, University of Washington; estimation of infarct size by electrocardiography, sudden cardiac death, physiological nursing.

Disteche, Christine M. * 1980; PhD, 1976, University of Liege (Belgium); molecular genetics of sex chromosomes, X inactivation, human and mouse cytogenetics.

Eisen, Harvey * 1986, (Affiliate); PhD, 1967, University of Toronto (Canada); host-parasite interactions, generation of genetic diversity.

Fausto, Nelson 1994; MD, 1960, Sao Paulo State University (Brazil).

Galloway, Denise A. * 1982, (Adjunct Research); PhD, 1976, City University of New York; viral pathogenesis and neoplasia.

Gown, Allen M. * 1978; MD, 1975, Albert Einstein College of Medicine; immunocytochemistry, cell differentiation markers in neoplasia, ovarian cancer, breast cancer.

Groudine, Mark * 1982, (Adjunct); MD, 1975, PhD, 1976, University of Pennsylvania; chromatin structure and gene activity in development and transformation.

Haggitt, Rodger C. 1984; MD, 1967, University of Tennessee; anatomic pathology, gastrointestinal pathology.

Harlan, John M. 1978, (Adjunct); MD, 1973, University of Chicago; hematology, leukocyte-endothelial interaction.

Hellstrom, Ingegerd * 1966, (Affiliate); DrMed, 1966, Karolinska Institute (Sweden); tumor immunology.

Kiviat, Nancy C. 1979; MA, 1970, MD, 1975, University of Washington; pathology, epidemiology and interrelationships between HIV, HPV, other STDs and malignancy.

Landolt, Marsha L. * 1975, (Adjunct); PhD, 1976, George Washington University; fish and shellfish disease.

Loeb, Lawrence A. * 1978; MD, 1961, New York University; PhD, 1967, University of California (Berkeley); DNA replication, cancer and AIDS.

Martin, George * 1957; MD, 1953, University of Washington; somatic cell genetics, pathobiology of aging, Alzheimer's disease, Werner's syndrome.

McDougall, James K. * 1982; PhD, 1971, University of Birmingham (UK); cell cycle, genetic instability and neoplasia.

Miller, Arthur D. * 1987, (Affiliate); PhD, 1982, Stanford University; retrovirus biology, gene transfer, gene therapy.

Mottet, N. Karle * 1959, (Emeritus); MD, 1952, Yale University; effects of trace elements, especially methylmercury and arsenic, on growth and development.

Narayanan, A. Sampath * 1971, (Research); PhD, 1967, University of Madras (India); connective tissue, periodontal disease, regulation of fibroblast growth, matrix synthesis.

Nelman, Paul E. * 1971, (Adjunct); MD, 1964, University of Washington; oncology.

Norwood, Thomas H. * 1973; MD, 1968, University of Maryland; somatic cell genetics, pathobiology of aging, mitotic cell cycle regulation.

Page, Roy C. * 1967; DDS, 1957, University of Maryland; PhD, 1967, University of Washington; connective-tissue pathology, chronic inflammation, immunopathology, periodontal disease.

Rabinovitch, Peter S. * 1980; MD, 1979, PhD, 1980, University of Washington; cellular aging, preneoplastic disease, cell cycle abnormalities, DNA change.

Reay, Donald T. 1982; MD, 1963, University of Utah; MPA, 1978, Seattle University; forensic medicine.

Reichenbach, Dennis D. * 1966; MD, 1958, University of Washington; cardiovascular pathology, myocardial cell injury.

Reidy, Michael A. * 1980; PhD, 1976, Cambridge University (UK); identification of migration specific genes, expression of matrix metalloproteinases.

Rohrschneider, Larry R. * 1982, (Affiliate); PhD, 1973, University of Wisconsin; control of growth, differentiation, transformation by the c-fms proto-oncogene.

Ross, Russell * 1962; DDS, 1955, Columbia University; PhD, 1962, University of Washington; atherosclerosis, growth factors, inflammation, vascular biology.

Sale, George E. 1977; MD, 1968, Stanford University; immunopathology of bone marrow transplantation, graft-versus-host.

Sarnat, Harvey B. 1992, (Adjunct); MD, 1966, University of Illinois; pediatric neurology, neuromuscular diseases, neurodevelopment.

Schwartz, Stephen Mark * 1974; MD, 1967, Boston University; PhD, 1973, University of Washington; vascular biology, atherosclerosis, molecular basis of lineage, developmental biology, cell kinetics.

Shaw, Cheng-Mei * 1963; MD, 1950, National Taiwan University; neuropathology, immunopathology, neurotoxicology, congenital malformation.

Shulman, Howard M. 1982; MD, 1971, University of California (Los Angeles); graft-versus-host disease; venoocclusive disease of the liver.

Smith, Gerald R. * 1983, (Affiliate); PhD, 1970, Massachusetts Institute of Technology; molecular biology of genetic recombination and regulation of gene expression.

Spence, Alexander M. 1974; MD, 1965, University of Chicago; neurology, neuro-oncology.

Stamatoyannopoulos, George 1965, (Adjunct); MD, 1958, DMedSc, 1960, University of Athens (Greece); medical genetics.

Sumi, Shuzo Mark * 1966; MD, 1956, University of Toronto (Canada); neuropathology, neuromuscular disease, neurodegenerative diseases.

Todaro, George J. * 1983, (Adjunct); MD, 1963, New York University; growth regulation in normal/tumor cells, growth factors and their receptors, novel cell therapies.

Wight, Thomas * 1978; PhD, 1972, University of New Hampshire; connective tissue biology and pathology, proteoglycans metabolism, atherosclerosis.

Wolf, Norman S. * 1968; DVM, 1953, Kansas State University; PhD, 1960, Northwestern University; hematopoietic stem cell dynamics and transplantation, aging at the cellular level.

Associate Professors

Alpers, Charles E. 1986; MD, 1978, University of Rochester; clinical and experimental glomerular disease, AIDS in man and experimental simian AIDS.

Berk, Bradford Charles 1994, (Adjunct); MD, 1981, PhD, 1981, University of Rochester; cardiology.

Eary, Janet F. 1986, (Adjunct); MD, 1980, Michigan State University; nuclear medicine.

Fligner, Corinne L. 1983; MD, 1976, University of New Mexico; autopsy and forensic pathology, fetal and perinatal pathology, forensic toxicology.

Grossmann, Angelika * 1985, (Adjunct Research); DVM, 1978, PhD, 1982, Freie University of Berlin (Germany); immunosenescence in humans and mice; immunotoxicology; transmembrane signaling in T-lymphocytes.

Hackman, Robert C. 1982; MD, 1971, Stanford University; infectious and pulmonary complications in immunocompromised patients.

Johnson, Richard J. 1986, (Adjunct); MD, 1979, University of Minnesota; nephrology.

Monnat, Raymond J. Jr. * 1982; MD, 1976, University of Chicago; somatic mutation, somatic cell molecular genetics, human genetic disease.

Myerson, David * 1985; PhD, 1979, Albert Einstein College of Medicine; the pathology of viral disease in humans.

Ott Ralph, Susan M. 1980, (Adjunct); MD, 1974, University of Washington; nephrology.

Patterson, Kathleen 1992; MD, 1976, University of Iowa; pediatric pathology.

Piepkorn, Michael W. 1991; MD, 1973, University of Minnesota; PhD, 1980, University of Washington; dermatology.

Rosenfeld, Michael E. * 1992, (Adjunct); PhD, 1981, University of Wisconsin; mechanisms of atherogenesis and macrophage gene expression.

Schmidt, Rodney 1984; MD, 1984, PhD, 1984, University of Washington; surgical pathology, pulmonary pathology, sarcomas, image analysis, electron microscopy.

Tait, Jonathan F. * 1983, (Adjunct); MD, 1983, PhD, 1983, Washington University; biochemistry of blood coagulation, laboratory diagnosis of genetic disorders.

Thorning, David R. 1982; MD, 1965, University of Kansas; anatomic pathology, pulmonary pathology, tissue biology, electron microscopy.

Vessella, Robert L. 1989, (Adjunct); PhD, 1974, University of Mississippi; tumor markers and immunology.

Assistant Professors

Bornfeldt, Karin E. 1991, (Research); PhD, 1991, Linköping University (Sweden); atherosclerosis, vascular biology, intercellular signalling, diabetics.

Bronner, Mary P. 1993; MD, 1989, University of Pennsylvania; gastrointestinal and hepatic pathology, neoplastic progression and transplantation pathology.

Giachelli, Cecilia * 1982, (Research); PhD, 1987, University of Washington; adhesion molecules and vascular biology processes.

Kapur, Raj P. 1992; MD, 1988, University of Southern California; human embryology, birth defects.

Kay, Mark A. 1993, (Adjunct); PhD, 1985, MD, 1987, Case Western Reserve University; medical genetics.

Murry, Charles E. 1989; PhD, 1989, Duke University; cardiovascular pathology, atherosclerosis, gene expression, myocardial infarction, gene therapy.

Porter, Peggy L. 1987; MD, 1987, University of New Mexico; cytology and breast cancer.

Rhim, Jonathan A. 1995; MD, 1989, George Washington University; liver stem cells, transgenic mice, pathology.

Swissheim, Karen 1980; PhD, 1989, University of Washington; senescence, breast cancer, gene expression, DNA methylation, cytogenetics.

Tapscott, Stephen J. 1990, (Adjunct); MD, 1982, University of Pennsylvania; neurology, molecular biology.

Instructors

Born, Donald E. * 1987, (Acting); MD, 1976, University of Chicago; central nervous system development, brain trauma, epilepsy.

Garcia, Rochelle 1988, (Acting); MD, 1989, University of Washington; cytology, gynecologic pathology.

Lemire, Joan M. 1991, (Acting); PhD, 1991, Brown University; proteoglycans, vascular smooth muscle, vascular development.

Lecturers

Lee, Ming Jong 1972; MD, 1963, Gunma University (Japan); surgical pathology, anatomical pathology.

Pendergrass, William R. 1980; PhD, 1977, University of Washington; DNA replication, caloric restriction, gerontology, in vitro senescence.

Seifert, Ronald A. 1981; PhD, 1983, University of Washington; growth factor/receptor structure and function.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Course numbers with a P suffix are not graduate courses and are restricted to medical student enrollment only.

PATH 410 Introduction to Pathology (4) *Wolf* Study of basic pathologic processes. Abbreviated coverage of systemic pathology. May be taken for decimal grade or S/NS. Decimal grade requires term paper. Required for physical therapy students. Prerequisite for other students: background in biologic sciences with some content of histology, physiology, biochemistry.

PATH 444 General Pathology (5) *Page* Basic pathologic processes that underlie disease, including cell alterations, genetic and developmental pathology, environmental pathology, neoplasia, immunopathology, inflammation, and infection. Correlates the gross, functional, and biochemical alterations. For second-year dental students and graduate students. Requires a reasonable grounding in biological and chemical sciences. Prerequisite for nondental and nonpharmacy students: permission of instructor.

PATH 445 Systemic Pathology (3) Survey of pathologic processes affecting organs and systems pertinent to the practice of dentistry. Lectures and demonstrations present a coherent picture of systemic disease. For first-year dental students, graduate students, and others with a reasonable background in biologic and chemical sciences. Prerequisites: 444 and permission of instructor for nondental students.

PATH 498 Undergraduate Thesis (*) Elective. Prerequisite: permission of instructor.

PATH 499 Undergraduate Research (*) Elective. Prerequisite: permission of instructor.

PATH 500 Molecular Basis of Disease (5) *Wight* Designed for first and second year graduate students to introduce the concepts of pathology and the modern day approaches to the study of disease. Integrates general and experimental pathology with cellular and molecular biology.

PATH 501 Cellular Response to Injury (3, max. 8) Lecture-seminar. Considerations of current concepts of cellular and subcellular reactions to injury, including neoplasia, as studied by modern techniques of cell biology. Required of all pathology graduate students. Prerequisite: permission of instructor.

PATH 502 Inflammation and Repair (2) Lecture-seminar; a seminar course dealing with an in-depth examination of the processes involved in inflammation and repair. Credit/no credit only. Prerequisite: permission of instructor. Offered: even years.

PATH 507 Cellular Pathology (2) Emphasis on application of recent developments and techniques in biology to problems of pathology. Series of lectures by eminent visiting scientists with expertise in the area being discussed. Credit/no credit only. Prerequisite: permission of instructor.

CONJ 508 EM Methods and Interpretation (3-5) See Conjoint Courses.

PATH 510 Anatomical Analysis of Disease (*, max. 30) The anatomical features of human disease as revealed at surgery or postmortem by gross examination and light microscopy are correlated with chemical and physiologic changes. Prerequisites: graduate student standing and permission of instructor.

C MED 512 Introduction to the Anatomical Analysis of Animal Disease (5, max. 10) See Comparative Medicine courses.

C MED 514 Comparative Pathology Conference (1, max. 6) See Comparative Medicine courses.

PATH 520 Experimental Pathology Seminar (1) *Giachelli* Review of current research in various areas of experimental pathology by members of the department and visiting scientists. Credit/no credit only.

CONJ 520 Anatomy and Autopsy (1/2) *Fligner* See Conjoint Courses.

PATH 522 Hematopathology Seminar (2) *Kachuk* Identification of normal lymphocyte and bone marrow subpopulations, diagnosis of leukemias, lymphomas, and benign conditions that resemble them. Emphasis on histopathology, cytochemical, immunological, and molecular markers. Clinicopathologic correlation. Offered: jointly with LAB M 522; even years.

PATH 530 Human Cytogenetics (*, max. 4) *Disteche* Sources and methods of preparation and identification of human chromosomes. Molecular structure and mapping of chromosomes. Human cytogenetic pathology: karyotype-phenotype interactions, chromosome breakage, and cancer cytogenetics. Prerequisite: permission of instructor. Offered: odd years.

PATH 535 Fundamentals of Human Disease (*, max. 20) Students study human pathology through participation in the autopsy service under direct supervision of a faculty member. They analyze the histologic, cellular, and biochemical aspects of selected cases, and present their observations in weekly seminars. Prerequisites: 444 or 555 and permission of course director: graduate students only.

PATH 551 Experimental and Molecular Pathology (2-5, max. 20) Introduction to experimental pathology. A tutorial course designed to introduce a graduate student (medical, dental) or senior undergraduate to selected methods and problems through literature, surveys and/or laboratory experience. Exploration of causes at the cellular and molecular levels in the study of disease is emphasized. Prerequisite: permission of instructor.

PATH 552 Contemporary Anatomic Pathology (2-5, max. 30) *Schwartz* Study of recent developments in anatomic pathology. Subject includes areas of basic science and review of systemic pathology. Recent developments and interpretation of these findings are stressed. For pathology residents, fellows, and trainees. Credit/no credit only. Prerequisite: permission of instructor.

PATH 555 Environmental Pathology (3) *Monnat* Modern morphologic, cell biological, and molecular approaches to environmental disease associated with exposure/predisposition. Lectures, seminar discussion, and student presentations. Prerequisites: 410 or 444 or HUBIO 520P. Recommended: ENVH/ENV S 514 and 515. Offered: alternate years.

CONJ 560, 561 Tumor Biology (3,2) See Conjoint Courses.

PATH 560 Molecular Analysis of Human Disease (*, max. 10) Review and discussion of contemporary research on molecular basis of human disease. Focus on mutational mechanisms, genetic instability, AIDS, and cancer. Students participate in weekly group discussion and work with faculty to select, develop, and present discussion topic. Prerequisite: medical, graduate, or professional standing and permission of instructor. Offered: AWSp.

PATH 562P Cardiovascular Pathology Conference (*) *Reichenbach* Course consists of two parts: a laboratory review of gross and microscopic cardiovascular pathology of selected autopsied cases followed by a combined clinical (medical and/or surgical) and pathology conference discussing these cases. Prerequisites: HUBIO 540P and permission of instructor.

PATH 563 Neuropathology (*) *Alvord, Shaw, Sumi* Course consists of ten parts. Conferences on gross

neuropathology (brain cutting and clinicopathologic correlations) held at six hospitals. Weekly neurology or surgical neuropathology conferences, neuropathology slide show, and neuropathology laboratory case studies. Prerequisite: permission of instructor.

PATH 564 Neuropathology Brain Modeling (4) *Alvord* Designed along clinically important, functional, neuroanatomic lines, generally based first on the embryologic development of the most primitive segmental elements (sensory, motor and association cells, and simple reflexes), followed by the more elaborate suprasegmental elements (cerebellum, colliculi, and forebrain).

PATH 571 Neuroanatomic Pathology (*) *Alvord, Shaw, Sumi* The particular diseases occurring in specific parts of the nervous system are considered in terms of the segmental, intersegmental, and suprasegmental components. Clinicopathologic correlations are emphasized. Prerequisite: permission of instructor; recommended as concurrent course: 563.

PATH 572 Neuropathologic Reactions (*) *Alvord, Shaw, Sumi* The reactions of the nervous system, considered in terms of congenital malformations, inflammations, vascular, traumatic, metabolic-toxic, degenerative, and neoplastic diseases peculiar to the nervous system as a whole. Clinicopathologic correlations are emphasized. Prerequisite: permission of instructor; recommended as concurrent course: 563.

PATH 576 Systemic Pathology II (3) Case examples of gastrointestinal, hematopoietic, lymphoreticular, musculoskeletal, urinary, skin systems, and forensic pathology discussed by students. Relevant laboratory interpretations. Student presentations. Prerequisites: HUBIO 520P or equivalent general pathology course, and permission of instructor.

PATH 584 Neuropathology Brain Modeling Laboratory (4) *Alvord* Clinically important, functional neuroanatomic study based on embryologic motor, sensory, and association cells and simple reflexes, followed by the more elaborate suprasegmental elements (cerebellum, colliculi, forebrain). Three-dimensional neuroanatomical relationships, critical for understanding neuropathology, can best be obtained in constructing a brain model. Prerequisite: 564, which may be taken concurrently.

PATH 600 Independent Study or Research (*) Credit/no credit only.

PATH 685P Surgical Pathology (*) Study of fresh current gross surgical specimens and autopsy specimens and their correlation to a patient's clinical course through observation of pathologists working in a large hospital setting. Prerequisite: permission of instructor.

PATH 686P Renal Pathology Conference (1) Conference-seminar on the histopathologic aspects of renal disease. May be taken concurrently with MED 693P. For third- and fourth-year students. Prerequisite: permission of instructor.

PATH 667P Renal Pathology Laboratory (*, max. 6) Laboratory elective for third- and fourth-year medical students. Read current literature, review various renal biopsies and urine sediments, and read standard texts prior to a weekly topic-oriented conference. All students earn 1 credit for one-hour seminar per week. May be taken concurrently with MED 693P. Prerequisite: permission of instructor.

PATH 668P Skin Pathology (*) Histopathological aspects of skin diseases are presented and discussed in a group-conference type of seminar. Current dermatologic cases also are discussed. Prerequisites: dermatology elective and permission of instructor.

PATH 673P Cardiovascular Pathology (*) *Reichenbach* Spectrum of cardiovascular pathology covered in depth by case studies and gross and microscopic material. Case analysis for presentation, including clinical and gross and microscopic material, pre-

pared outside of class time. Clinicopathologic correlation is emphasized. Prerequisites: HUBIO 540P and permission of instructor and second-year medical student standing.

PATH 679P Pathology Summer Clerkship (*, max. 24) Dissection, writeup, and literature review of autopsy and surgical pathology specimens by students. Emphasis on etiology and pathogenesis of disease as a biological process. Designed for students who have not completed organ systems as covered in Human Biology courses. Offered at University of Washington Medical Center, Harborview Medical Center, Veterans Administration Hospital, Madigan Army Medical Center, and Swedish Hospital. Prerequisites: HUBIO 520P and completion of first year of medical school.

PATH 680P Diagnostic Pathology Clerkship—University of Washington Medical Center (*, max. 24) *Fligner, Bronner* Medical student participation in dissection and study of autopsy and surgical pathology cases. Cases worked up under senior staff, including dissection, microscopic examination, and literature review. Attendance at pathology conferences and seminars expected. Prerequisite: third- or fourth-year student standing.

PATH 681P Diagnostic Pathology Clerkship—Harborview Medical Center (*, max. 24) *Reichenbach* For description and prerequisite, see 680P.

PATH 682P Diagnostic Pathology Clerkship—Veterans Administration Hospital (*, max. 24) *Thorning* For description and prerequisite, see 680P.

PATH 683P Diagnostic Pathology Clerkship—Medical Examiner's Office (*, max. 24) *Haruff* For description and prerequisite, see 680P.

PATH 684P Diagnostic Pathology Clerkship—Laboratory Pathology of Seattle (*, max. 24) *Kulander* For description and prerequisite, see 680P.

PATH 685P Diagnostic Pathology Clerkship—Sacred Heart Hospital, Spokane (*, max. 24) *Williamson* For description and prerequisite, see 680P.

PATH 686P Diagnostic Pathology Clerkship—Overlake Medical Center (*, max. 24) For description and prerequisite, see 680P.

PATH 687P Diagnostic Pathology Clerkship—Children's Hospital and Medical Center (*, max. 24) *Patterson* For description and prerequisite, see 680P.

PATH 688P Diagnostic Pathology Clerkship—Madigan Army Medical Center (*, max. 24) *Kelley* For description and prerequisite, see 680P.

PATH 689P Diagnostic Pathology Clerkship—Valley Medical Center (*, max. 24) *Treseler* For description and prerequisite, see 680P.

PATH 690P Diagnostic Pathology Clerkship—Northwest Medical Center (*, max. 24) *Patton* For description and prerequisite, see 680P.

PATH 691P Diagnostic Pathology Clerkship—General Hospital of Everett (*, max. 24) *Lipo* For description and prerequisite, see 680P.

PATH 692P Diagnostic Pathology Clerkship—Group Health Cooperative (*, max. 24) *Mullen* For description and prerequisite, see 680P.

PATH 697P Pathology Special Electives (*, max. 24) By specific arrangement, students can have clerkships, externships, or research opportunities at institutions other than the University of Washington. Students who wish to elect this course should obtain Special Assignment forms from the Dean's office at least one month before advance registration. Prerequisite: permission of instructor.

PATH 700 Master's Thesis (*)

PATH 800 Doctoral Dissertation (*)

Pediatrics

RR314 Health Sciences

Pediatrics involves the study of physical and behavioral development of man, in health and disease, from conception to maturity.

Instruction is provided through conjoint courses, lectures, conferences, clerkships, and electives. Faculty members participate in teaching the basic curriculum and offer 24 electives, including the general pediatrics clerkship at multiple WAMI sites. A residency program is offered with a wide variety of electives in addition to traditional hospital inpatient and clinic experience. Postdoctoral fellowship training is available in many subspecialty areas of pediatrics. The major teaching hospitals in Seattle are Children's Hospital and Medical Center, University of Washington Medical Center, and Harborview Medical Center.

Faculty

Chair

F. Bruder Stapleton

Professors

Benjamin, Denis R. * 1975, (Adjunct); MBChB, 1968, University of Witwatersrand (South Africa); pediatric pathology, hematopathology nutrition, circadian rhythms.

Bennett, Forrest C. 1977; MD, 1970, University of Minnesota; child development and handicapped children.

Bergman, Abraham 1964; MD, 1958, Case Western Reserve University; ambulatory pediatrics.

Bernstein, Irwin D. 1980; MD, 1967, New York University; hematology, oncology.

Chen, Shi-Han 1972, (Research); PhD, 1968, University of Texas (Austin); pediatric genetics.

Christie, Dennis L. 1976; MD, 1968, Northwestern University; gastroenterology.

Clarren, Sterling K. 1978; MD, 1973, University of Minnesota; congenital defects.

Connell, Frederick A. * 1978, (Adjunct); MD, 1972, New York University; maternal and child care, health services.

Coombs, John B. 1983; MD, 1972, Cornell University; rural health policy, nutrition and medicine.

Corey, Lawrence * 1977, (Adjunct); MD, 1971, University of Michigan; laboratory medicine: diagnosis, therapy, and pathogenesis of viral infections, AIDS virus.

Deisher, Robert W. 1949, (Emeritus); MD, 1944, Washington University; adolescent medicine.

Emanuel, Irvin * 1966; MD, 1960, University of Rochester; child development and mental retardation.

Fantel, Alan G. * 1973, (Research); PhD, 1974, University of Washington; embryology, teratology.

French, James W. 1970; MD, 1963, University of Michigan; pediatric cardiology.

Graham, C. Benjamin 1956; MD, 1958, University of Washington; pediatric, neonatal radiology.

Guntheroth, Warren G. 1958; MD, 1952, Harvard University; pediatric cardiology.

Guralnick, Michael J. 1986; MS, 1964, PhD, 1967, Lehigh University; developmental disabilities, peer re-

lations, social and language development, evaluation systems.

Hayden, Patricia 1958, (Emeritus); MD, 1953, University of Rochester; congenital defects.

Hodson, W. Alan 1966; MD, 1959, University of Manitoba (Canada); MMSc, 1964, Ohio State University; neonatal and respiratory diseases.

Jaffe, Kenneth M. * 1981, (Adjunct); MD, 1975, Harvard University; pediatric rehabilitation, brain injury, neuromuscular diseases, congenital defects, electromyography.

Lemire, Ronald J. 1967; MD, 1962, University of Washington; teratology.

Lynn, Anne 1981, (Adjunct); MD, 1975, Stanford University; anesthesiology.

Mackler, Bruce 1957, (Emeritus); MD, 1943, Temple University; developmental biology.

Marcuse, Edgar K. 1973; MD, 1967, Stanford University; MPH, 1973, University of Washington; general pediatrics.

McLaughlin, John F. 1977; MD, 1970, Northwestern University; congenital defects.

Mirkes, Philip E. 1979, (Research); PhD, 1970, University of Michigan; human embryology.

Murray, Jeffrey P. 1980, (Adjunct); MD, 1974, University of Rochester.

Neff, John 1981; MD, 1960, Harvard University; infectious disease.

Novack, Alvin H. 1979; MD, 1958, Temple University; general pediatrics.

Ochs, Hans D. 1969; MD, 1962, University of Freiburg (Germany); immunology.

Osborne, William R. 1975, (Research); PhD, 1972, University of London: King's College (UK); pediatric genetics.

Pagon, Roberta A. 1975; MD, 1972, Harvard University; medical genetics.

Pious, Donald A. * 1964; MD, 1956, University of Pennsylvania; antigen processing, function of nonclassical MHC genes, MHC gene regulation.

Redding, Gregory J. 1980; MD, 1974, Stanford University; neonatal biology.

Rivara, Frederick P. * 1984; MD, 1974, University of Pennsylvania; pediatric epidemiology and injury prevention and research.

Robertson, William O. 1963; MD, 1949, University of Rochester; general pediatrics, toxicology.

Rothenberg, Michael B. 1967, (Emeritus); MD, 1954, Case Western Reserve University; psychiatry and behavioral sciences.

Rubens, Craig E. * 1984; PhD, 1978, Medical University of South Carolina; MD, 1982, University of Washington; molecular pathogenesis of Group B streptococcal infections in newborn infants.

Ruvalcaba, Rogelio 1965; MD, 1957, University of Guadalajara (Mexico); endocrinology.

Sanders, Jean E. 1975; MD, 1970, University of Iowa; hematology, oncology.

Samat, Harvey B. 1992; MD, 1966, University of Illinois; pediatric neurology, neuromuscular diseases, neurodevelopment.

Scott, C. Ronald * 1965; MD, 1959, University of Washington; diagnosis and nutritional management of genetic disorders of children.

Shepard, Thomas H. 1955, (Emeritus); MD, 1948, University of Rochester; embryology.

Shurtliff, David B. * 1960; MD, 1955, Tufts University; congenital defects.

Smith, Nathan J. * 1965, (Emeritus); MD, 1945, University of Wisconsin; sports medicine.

Stapleton, F. Bruder 1996; MD, 1972, University of Kansas; nephrology.

Stevenson, James G. 1976; MD, 1970, Baylor University; pediatric cardiology.

Sybert, Virginia 1979; MD, 1974, State University of New York (Buffalo); genetics and dermatology.

Tapper, David 1983, (Adjunct); MD, 1970, University of Maryland; pediatric surgery.

Wedgwood, Ralph J. 1962, (Emeritus); MD, 1947, Harvard University; rheumatology.

Wilson, Christopher B. * 1980; MD, 1972, University of California (Los Angeles); immunology, rheumatology, infectious diseases.

Woodrum, David E. 1971; MD, 1965, University of Illinois; neonatal and respiratory diseases.

Associate Professors

Andrews, Robert G. 1982; MD, 1976, University of Minnesota; hematology/oncology.

Bowden, Raleigh A. 1983; MD, 1978, University of Washington; hematology/oncology.

Brewer, David K. 1978, (Adjunct); MD, 1972, Harvard University; pediatric radiology, angiography, computed tomography.

Burns, Jane L. 1982; MD, 1978, University of Washington; infectious diseases.

Clarke, William R. 1988, (Adjunct); MD, 1979, Duke University.

Cotner, Thomas M. 1982, (Research); PhD, 1978, Massachusetts Institute of Technology; developmental biology.

Donat, Jane F. 1994; MD, 1970, Albert Einstein College of Medicine; pediatric neurology.

Farrow, James A. 1979; MD, 1973, Baylor University; adolescent medicine.

Farwell, Jacqueline R. 1979; MD, 1972, University of California (San Francisco); child neurology, especially epilepsy; neonatal neurology, brain tumors in children.

Francis, Julie S. 1989; MD, 1984, University of Washington; dermatology.

Frenkel, Lisa M. 1994; MD, 1987, University of Kansas; infectious diseases.

Geyer, Jeffrey R. 1986; MD, 1977, Wayne State University; hematology/oncology.

Gibson, Ronald L. Jr. 1987; MD, 1982, PhD, 1982, Washington University; pulmonology.

Grossman, David C. 1988; MD, 1982, University of California (Los Angeles); MPH, 1990, University of Washington; general pediatrics.

Haberkern, Charles M. 1988, (Adjunct); MD, 1974, Columbia University; anesthesiology.

Hays, Ross M. * 1983, (Adjunct); MD, 1978, University of Washington; pediatric rehabilitation, brain injury, neuromuscular diseases, congenital defects, electromyography.

Herndon, S. Paul 1975; MD, 1970, George Washington University; pediatric cardiology.

Holm, Vanja A. 1965, (Emeritus); MD, 1954, Karolinska Institute (Sweden); child development.

Jackson, J. Craig 1982; MD, 1979, Vanderbilt University; neonatal and respiratory diseases.

Kawabori, Isamu 1973; MD, 1966, University of Washington; pediatric cardiology.

Kletter, Gad B. 1995; MD, 1982, Sackler School of Medicine, Israel; pediatric endocrinology.

Lewis, David B. * 1988; MD, 1981, University of California (San Francisco); T lymphocyte cytokine biology, infectious diseases.

Marshall, Susan G. 1986; MD, 1980, University of California (Los Angeles); neonatal and respiratory diseases.

Mayock, Dennis Edward 1985; MD, 1975, Ohio State University; neonatology and respiratory diseases.

Millstein, Jerrold M. 1977; MD, 1964, University of Minnesota; pediatric neurology.

Moselay, Stephen L. * 1985, (Adjunct); PhD, 1981, University of Washington; molecular basis of pathogenesis in *E. coli* diarrhea.

Murphy, Janet Haworth 1974; MBChB, 1967, Victoria University (UK); neonatal biology and respiratory disease.

O'Rourke, Patricia Pearl 1988, (Adjunct); MD, 1975, University of Minnesota; anesthesiology.

Pendergrass, Thomas W. 1978; MD, 1971, University of Tennessee; MPH, 1979, University of Washington; hematology, oncology.

Portman, Michael A. 1992; MD, 1980, University of Cincinnati; pediatric cardiology.

Quan, Linda 1976; MS, 1969, Dartmouth College; MD, 1971, University of Washington; pediatric emergency medicine.

Ramsey, Bonnie W. 1980; MD, 1976, Harvard University; general pediatrics.

Rosenbaum, David M. 1983, (Adjunct); MD, 1977, Albert Einstein College of Medicine; pediatrics.

Sherry, David Dan 1984; MD, 1977, Texas Technological University; immunology/rheumatology.

Smith, Mark S. 1977; MD, 1969, University of Virginia; adolescent medicine.

Sorensen, Gregory K. 1982, (Adjunct); MD, 1978, University of Nebraska.

Spiers, Philip S. 1989, (Research); PhD, 1966, Oxford University (UK); AIDS.

Standaert, Thomas A. 1971, (Research); PhD, 1970, Duke University; neonatal and respiratory diseases.

Sulzbacher, Stephen 1976; MA, 1964, Hollins College, Virginia; PhD, 1971, University of Washington; psychiatry and behavioral sciences.

Tarr, Phillip I. 1988; MD, 1980, Yale University; gastroenterology/infectious diseases.

Tyler, Donald C. 1977; MD, 1970, University of Pennsylvania; anesthesiology, pediatrics.

Wallace, Carol A. 1982; MD, 1973, University of Michigan; immunology/rheumatology.

Watkins, Sandra L. 1986; MD, 1981, University of Texas (Houston); nephrology.

Weinberger, Edward 1985, (Adjunct); MD, 1979, Harvard University; pediatric radiology.

Weiss, Avery H. 1991, (Adjunct); MD, 1974, Miami University (Ohio); pediatric ophthalmology, strabismus.

Zelikovic, Israel 1989; MD, 1977, Tel Aviv University (Israel); nephrology.

Assistant Professors

Astley, Susan J. * 1992, (Adjunct); PhD, 1990, University of Washington; chronic childhood diseases.

Bilge, Sima 1994, (Research); PhD, 1992, University of Washington; gastroenterology.

Brownstein, Dena R. 1986; MD, 1982, University of Washington; pediatric emergency medicine.

Cecchin, Frank 1995; MD, 1987, East Carolina University; cardiology, pediatric.

Cunningham, Michael L. 1993; MD, 1988, University of Vermont; congenital defects.

Davis, Robert L. 1991; MD, 1983, University of California (San Diego); MPH, 1993, University of Washington; general pediatrics.

Del Beccaro, Mark A. 1989; MD, 1985, University of Washington; pediatric emergency medicine.

Diekema, Douglas S. 1993; MD, 1985, University of North Carolina; MPH, 1993, University of Washington; pediatric emergency medicine.

Fouser, Laurie S. 1989; MD, 1979, University of Nebraska; nephrology.

Graf, William D. 1991; MD, 1983, Freie University of Berlin (Germany); congenital defects.

Graham, Elinor A. 1982; MD, 1970, University of Rochester; MPH, 1993, Johns Hopkins University; general pediatrics.

Hudgins, Louanne 1993; MD, 1984, University of Kansas; medical genetics.

Jones, Thomas K. 1983; MD, 1978, Jefferson Medical College; pediatric cardiology.

Kahn, Stuart J. 1991; MD, 1985, University of Medicine & Dentistry of New Jersey; rheumatology.

Kapur, Raj P. 1992, (Adjunct); MD, 1988, University of Southern California; human embryology, birth defects.

Kay, Mark A. 1993, (Adjunct); PhD, 1985, MD, 1987, Case Western Reserve University; medical genetics.

Klein, Eileen J. 1988, (Acting); MD, 1988; Johns Hopkins University; pediatric emergency medicine.

Leppig, Kathleen 1989, (Acting); MD, 1986, Case Western Reserve University; medical genetics.

Lozano, Paula 1989, (Acting); MD, 1989, Harvard University; MPH, 1994, University of Washington; general pediatrics.

Martin, David 1990; MD, 1981, Virginia College of Medicine; hematology, oncology.

Martin, Lynn D. 1994, (Adjunct); MD, 1982, University of Washington; pediatric anesthesiology.

Massagil, Teresa L. * 1985, (Adjunct); MD, 1982, Yale University; medical and rehabilitation outcome after spinal cord injury in children.

Matthews, Dana C. 1987; MD, 1981, University of Washington; hematology/oncology.

McCloskey, John P. 1990, (Acting); MD, 1983, University of California (San Francisco); pediatric cardiology.

McDonald, Ruth A. 1987, (Acting); MD, 1987, University of Minnesota; nephrology.

Melzer, Sanford M. 1990; MD, 1982, Mt Sinai School of Medicine; general pediatrics.

Milner, Laurie A. 1989; MD, 1986, University of Texas (Austin); pediatric hematology/oncology.

Mouradian, Wendy Elyse 1987, (Acting); MD, 1977, Columbia University; congenital defects.

Rho, Jong M. 1995; MD, 1987, University of Cincinnati; pediatric neurology.

Shugerman, Richard P. 1987; MD, 1984, University of Alabama; general pediatrics.

Stout, James W. 1994; MAT, 1981, Duke University; MD, 1986, Wake Forest University; general pediatrics.

Strandjord, Thomas P. 1990; MD, 1983, Johns Hopkins University; neonatal biology and respiratory diseases.

Tarczy-Hornoch, Peter 1992, (Acting); MD, 1989, Stanford University; neonatal and respiratory diseases.

Taylor, James A. Jr. 1987; MD, 1980, University of North Carolina; general pediatrics.

Walters, Mark C. 1993; MD, 1985, University of California (San Diego); pediatric hematology/oncology.

Wright, Jeffrey A. 1988; MD, 1978, University of Missouri; general pediatrics.

Instructors

Melvin, Ann Jorns 1993, (Acting); MD, 1986, Tulane University; infectious diseases.

Morishima, Chihiro 1995, (Acting); MD, 1988, Washington University; pediatric rheumatology.

Park, Julie R. 1995, (Acting); MD, 1988, University of Vermont; hematology, oncology.

Sievers, Eric L. 1995, (Acting); MD, 1988, Brown University; hematology, oncology.

Tamura, Glen S. 1994, (Acting); MD, 1987, PhD, 1987, Stanford University; infectious diseases.

Lecturers

Rees, Jane 1973; MS, 1972, University of Washington; adolescent medicine, nutrition.

Rice, Stephen G. 1974; MD, 1974, PhD, 1974, New York University; MPH, 1983, University of Washington; sports medicine.

Trahms, Cristine M. 1973; MS, 1972, University of Washington; maternal and child nutrition.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Course numbers with a P suffix are not graduate courses and are restricted to medical student enrollment only.

PEDS 498 Undergraduate Thesis (*) *Robertson* For medical students. Prerequisite: permission of instructor. Offered: AWSpS.

PEDS 499 Undergraduate Research (*) *Robertson* Participation in various clinical or basic research programs in progress, specifically: child development, developmental biology, human embryology and teratology, medical genetics, infectious diseases, neonatology, neuroembryology, cardiology, endocrinology and metabolism, immunology, respiratory disease. Prerequisite: permission of instructor. Offered: AWSpS.

PEDS 500P Topics in Adolescent Medicine for Medical Professionals (1) *Farrow* Survey course on adolescent health-care topics, including psychological and physical development, sexuality, gynecological problems, chronic illness and hospitalization, acne treatment, office approach. Prerequisites: 665P, MED 665P, and PBSCI 665P; postdoctoral medical trainees. Offered: AWSpS.

PEDS 505P Preceptorship in Pediatrics (1) *Robertson* To provide opportunity for first- and second-year medical students to gain personal experience with medical practice situations for pediatricians by being stationed with carefully selected clinical faculty members in their offices. Prerequisite: permission of instructor. Enrollment limited. Coordinator: Department of Pediatrics. Offered: AWSpS.

PEDS 512P Seminars in Human Embryology and Teratology (3) *Lemire, Mirkes* Presents in depth discussions of human embryonic-fetal development and malformations that arise, correlations with experimental studies and molecular embryology are included. A laboratory experience is optional. Prerequisite: permission of instructor. Offered: AWSpS.

PEDS 530P Pioneer Square Adolescent Seminar (1) *Deisher* Clinic-based setting for seminar and interview practice with Pioneer Square adolescents; students learn how to deal with special health problems and other related problems of "street kids" through interviews and observations. Credit/no credit only. Offered: W.

PEDS 551P Pediatric Electrocardiography (2) *Gunteroth* Brief review of the physiology and phys-

ics pertinent to clinical electrocardiography is followed by a presentation of terminology and methods in clinical use. Normal electrocardiograms are studied, followed by abnormal tracings, with emphasis on pediatric material, but including adult material such as myocardial infarction. Prerequisite: HUBIO 540P. Offered: W.

PEDS 611P Pioneer Square Night Clinic (*, max. 24) *Deisher* One night per week at free clinic in Pioneer Square area. Adolescent and young adult patients, generally poorly educated with low incomes and histories of inadequate health care. Seminars and interviews in conjunction with clinic focus on impact of nontraditional lifestyles and values on health status of individuals. (Limit: four students.) Offered: AWSpS.

PEDS 662P, 663P, 664P, 665P, 666P, 667P, 668P Pediatric General Clerkship (*, max. 24, *, max. 24, *, max. 24, *, max. 24, *, max. 24, *) *Robertson* General introductory pediatric clerkship. One-half in hospital setting; one-half in outpatient department, clinic, or private office. Location preferences are considered; twelve-week clerkship is broader, permits more individual selection of site. Open to all third- and fourth-year medical students. Prerequisite: HUBIO 563P. (Six or twelve weeks, full time. Limit: twenty-four students.) Offered: AWSpS.

PEDS 669P Neonatal Pediatrics—Clerkship (*, max. 24) *Hodson* Participation in the activities in the newborn and premature divisions; ward rounds, seminars, conferences, and familiarization with certain laboratory techniques, particularly those relating to acid-base balance. Prerequisite: 665P. (Limit: two students.) Offered: AWSpS.

PEDS 670P Pediatric Infectious Diseases (*, max. 24) *Burns* Students see and work up clinic consultations and present in detail to attending physician. Daily rounds include problem-solving discussions and didactic presentations in broad category of infectious diseases. Opportunity for experience in clinical research and laboratory techniques. Prerequisites: 665P or permission; third- or fourth-year medical student standing. (Limit: one student.) Offered: AWSpS.

PEDS 673P Office Practice (*, max. 12) *Robertson* Opportunity to observe and function in the private office settings of a number of clinical pediatric faculty and to accompany pediatricians as they pursue their daily activities in the community. Prerequisite: 665P. Offered: AWSpS.

PEDS 676P Pediatric Clerkship With the Mentally Handicapped (*, max. 12) *Ruvalcaba (Rainier School), Singh (Fircrest School)* Total care involvement with mentally handicapped patients, incorporating general pediatric knowledge of mental retardation and neurology, plus other specialties related to mental deficiencies. Additional information may be obtained from Dr. W. O. Robertson, Children's Hospital and Medical Center. Prerequisite: 665P. (Four or six weeks, full-time.) Offered: AWSpS.

CONJ 677P Clinical Allergy and Immunology (*, max. 12) See Conjoint Courses.

PEDS 679P Clinical Problems in Developmental Disabilities (*, max. 12) *Holm* Experience in multidisciplinary evaluation and management of the handicapped child. Student performs pediatric evaluations, obtains appropriate consultations, observes additional professional assessments (e.g., psychological testing), and plans rehabilitation program. Opportunity to provide parent counseling. Prerequisite: 665P. (Limit: two students.) Offered: AWSpS.

PEDS 680P Pediatric Clinics (*, max. 24) *Robertson* One to ten half-day sessions may be elected each week for twelve weeks in the following areas: general pediatrics, endocrinology, neurology, immunology, arthritis, cardiology, congenital defects and retardation, well-child, teratology, adolescent medicine, allergy, cystic fibrosis, hematology, prematurity, neonatology, and poison control. Enrollment lim-

ited. Coordinator: Department of Pediatrics. Prerequisite: 665P.

PEDS 681P Pediatric Genetics (*, max. 24) Pagon Clinical focus on evaluation and management of children with genetic disorders. Exposure to genetic counseling, the evaluation of children with hereditary structural defects, and diagnosis and management of children with inborn errors of metabolism. Emphasis on genetic mechanisms that cause human disease. Prerequisite: 665P. (Two, four, six, or twelve weeks. Limit: one student.) Offered: AWSpS.

PEDS 682P Congenital Defects—Clinical Experience (*, max. 24) Shurtleff Advanced course in pediatrics providing experience in the clinical diagnosis and management of structural and metabolic congenital defects. Prerequisite: permission of instructor. (Limit: one student.) Offered: AWSpS.

PEDS 683P Pediatric Nephrology (8) Four-week elective clerkship at Children's Hospital and Medical Center. Students participate in nephrology and transplant rounds, consult with renal fellows and attendings, and work up patients in renal clinics. Participation in seminars; special course in fluid balance. Prerequisites: third- or fourth-year medical student, 665, and MED 665 or equivalent. (Limit: two students.) Offered: AWSpS.

PEDS 684P Pediatric Pulmonary Medicine (8) Redding Respiratory disorders, diagnostic techniques and treatments unique to children in the inpatient, intensive care, and outpatient settings. Application of principles of pulmonary physiology to clinical problems. Students conduct consultations under the supervision of the attending and present a topic of choice. Inpatient rounds and clinics. Prerequisites: 665P, fourth-year medical student standing. (Limit: one student.) Offered: AWSpS.

PEDS 685P Pediatric Hematology and Oncology (*, max. 24) Bernstein One-on-one teaching plus four weekly didactic sessions. Specific training in techniques and interpretation of bone marrow aspirations, intravenous chemotherapy, transfusions, and laboratory techniques of hematologic evaluation. Self-learning programs available. Prerequisite: 665P. (Two, four, six, or twelve weeks, full-time.) (Limit: one student.) Offered: AWSpS.

PEDS 686P Pediatric Cardiology (*, max. 24) Guntheroth, Kawabori Emphasis on physical diagnosis and electrocardiography and on clinical knowledge of diagnostic techniques and surgical possibilities for inpatients and outpatients with cardiovascular problems. Opportunity to observe catheterizations and cardiovascular operations. Weekly clinics and twice-daily inpatient rounds. Prerequisite: 665P. (Limit: one student.) Offered: AWSpS.

PEDS 687P Advanced Clinical Clerkship in Child Neurology (*, max. 8) Samat Advanced course in neurology dealing with neurological disease in children. Both inpatient and outpatient experience are included. Prerequisite: 665P. (Limit: one student.) Offered: AWSpS.

PEDS 688P Adolescent Clinic (*, max. 24) Farrow Advanced pediatric clerkship dealing with special problems of the adolescent. Medical students are offered an experience in a multidisciplinary clinic. Prerequisite: 665P. (Limit: two students.) Offered: AWSpS.

PEDS 691P Advanced Pediatric Clerkship (*, max. 24) Robertson Inpatient and/or outpatient experience with responsibilities comparable to intern for patient workup, diagnosis, and care. Available at any one, or combination, of affiliated hospitals, including WAMI units in Idaho, Montana, or Washington. Students interested in this option should make arrangements well in advance of registration. Prerequisite: 665P. (Limit: two students.) Offered: AWSpS.

PEDS 697P Pediatric Special Electives (*, max. 24) Robertson By specific arrangement, for qualified students, special clerkship externship or research opportunities at institutions other than University of Washington. The faculty can advise of possible opportunities. Obtain special assignment form from Dean's office at least one month before preregistration. Prerequisite: permission of instructor. Offered: AWSpS.

Pharmacology

E401 Health Sciences

Pharmacology is the science that deals with the nature of interactions between drugs and biological systems, and with the applications of such interactions to the treatment of disease. Courses in this field are given for medical, dental, pharmacy, nursing, and graduate students.

Graduate Program

The Department of Pharmacology offers programs leading to the Master of Science and Doctor of Philosophy degrees. The Master of Science degree may be elected by the student or requested by the department.

Master of Science and Doctor of Philosophy

Admission Requirement: A baccalaureate degree with a major in any of the sciences, such as biochemistry, chemistry, pharmacy, physics, physiology, psychology, or zoology.

Master of Science

Graduation Requirements: completion of Graduate School requirements to include: PHCOL 511, 512, 513, 519, and five additional 500-level pharmacology courses plus 9 credits of CONJ 504, 505, 506, 3 non-seminar credits of physiology, and 3 non-seminar credits chosen from biochemistry, molecular biology, physiology, immunology, or cell biology for a total of 15 credits. All 15 credits must be at the approved 400 or 500 level. Students must pass a comprehensive General Examination covering general pharmacology and allied disciplines. A dissertation and Final Examination complete the program.

Doctor of Philosophy

Graduation Requirements: completion of Graduate School requirements to include: PHCOL 511, 512, 513, 519, and five additional 500-level pharmacology courses plus 9 credits of CONJ 504, 505, 506, 3 non-seminar credits of physiology, and 3 non-seminar credits chosen from biochemistry, molecular biology, physiology, immunology, or cell biology for a total of 15 credits. All 15 credits must be at the approved 400 or 500 level. Students must pass a comprehensive General Examination covering general pharmacology and allied disciplines. A dissertation and Final Examination complete the program.

In the first year, students generally are expected to enroll in biochemistry, pharmacology, and physiology courses. For each of the academic quarters of the first year, a student may work with a different faculty member. The purpose of rotating among the faculty is to acquaint the student with various areas of pharmacology and research under investigation within the department. With this insight, the student should be better able to decide on a thesis or dissertation topic.

In the second year, while becoming more involved with research, the student continues attending courses in pharmacology and supporting disciplines. Immediately after spring quarter of the second year, the student will be given the written portion of the General Examination. Within three months after having taken the written portion, the student will be given the oral portion of the General Examination. The student's supervisory committee will then recommend that the student (1) continue to pursue the doctoral degree, (2) work for a master's degree, (3) undergo reexamination at a later date, or (4) terminate the program.

Continued work in the department for a Ph.D. or M.S. degree usually involves taking advanced biochemistry, pharmacology, and physiology courses and research.

Financial Aid

A limited number of teaching assistantships, research assistantships, and traineeships are available.

Correspondence and Information

Admissions Coordinator
Department of Pharmacology, Box 357280

Faculty

Chair

William A. Catterall

Professors

Aagaard, George N. * 1954, (Emeritus); MD, 1937, University of Minnesota; clinical pharmacology.

Beavo, Joseph A. * 1977; PhD, 1970, Vanderbilt University; roles and molecular mechanisms of cyclic nucleotide phosphodiesterase regulation of cell function.

Bornszyk, Karol 1983, (Adjunct); MD, 1977, University of Rochester; nephrology.

Catterall, William A. * 1977; PhD, 1972, Johns Hopkins University; molecular biology of ion channels, molecular pharmacology and neurobiology.

Dorsa, Daniel M. * 1981; PhD, 1977, University of California (Davis); neuropharmacology, neurochemistry.

Hol, Wilhelmus G. J. * 1992, (Adjunct); PhD, 1971, University of Groningen (Netherlands); protein crystallography, drug design, vaccine development, and protein engineering.

Horita, Akira * 1950; PhD, 1954, University of Washington; neuropsychopharmacology.

Juchau, Mont Rawlings * 1969; PhD, 1966, University of Iowa; developmental pharmacology, drug metabolism.

Krebs, Edwin G. * 1977, (Emeritus); MD, 1943, Washington University; intracellular signaling mechanisms involving protein phosphorylation.

McKnight, G. Stanley * 1979; PhD, 1976, Stanford University; phosphorylation; gene expression and neuroendocrine physiology in mice using genetic approaches.

Nathanson, Neil M. * 1979; PhD, 1975, Brandeis University; molecular analysis of neural signal transduction by muscarinic neurokinin receptors.

Omiecinski, Curtis J. * 1983, (Adjunct); PhD, 1980, University of Washington; molecular toxicology, genetic regulation/expression of drug/chemical metabolizing enzymes.

Storm, Daniel R. * 1978; PhD, 1971, University of California (Berkeley); molecular basis of neuroplasticity; cAMP and Ca²⁺ signal transduction systems in the CNS.

Vestal, Robert E. 1977, (Adjunct); MD, 1971, University of California (San Francisco); gerontology.

Vincenzi, Frank F. * 1967; PhD, 1965, University of Washington; ion transport and intracellular calcium, free radicals and disease, computers in education/research.

Watson, Eileen L. * 1972, (Adjunct); PhD, 1970, University of Utah; salivary gland pharmacology and regulation.

Associate Professors

Chavkin, Charles * 1984; PhD, 1982, Stanford University; cell and molecular mechanisms of psychoactive opiate drugs to understand normal and pathophysiology.

Halpern, Lawrence M. * 1965; PhD, 1961, Albert Einstein College of Medicine; neuropharmacology.

Hamblin, Mark W. 1990, (Adjunct); MD, 1982, PhD, 1982, University of California (San Diego).

Moon, Randall T. * 1985; PhD, 1982, University of Washington; embryonic development; signal transduction.

Palczewski, Krzysztof * 1992, (Adjunct); MS, 1980, PhD, 1986, Technical University of Wrocław (Poland); visual transduction.

Tempel, Bruce L. * 1988; PhD, 1983, Princeton University; molecular neurobiology/neurogenetics, especially potassium channel gene structure and function.

Assistant Professors

Bajjalieh, Sandra M. * 1995; MS, 1983, University of Illinois; PhD, 1989, University of Wisconsin; molecular neurobiology.

Wang, Edith H. 1996; PhD, 1991, Columbia University; mechanisms that govern cell growth.

Lecturer

Westenbroek, Ruth E. 1984; PhD, 1987, University of Washington; expression of calcium channels in developing and adult nervous systems.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

PHCOL 401 General Pharmacology I (2-4)
Juchau, Storm Principles governing drug-receptor interactions, dose-effect relationships, drug absorption, distribution, metabolism, and excretion. Drug toxicity, tolerance, allergy, and drug-induced mutagenesis and carcinogenesis. Drugs utilized as antimicrobial agents and cancer chemotherapeutic agents. Prerequisites: organic chemistry, introductory anatomy, physiology, and biochemistry. For pharmacy students and other undergraduates. Offered: A.

PHCOL 402 General Pharmacology II (3/4)
Chavkin, Nathanson General pharmacology of drugs affecting the autonomic and central nervous systems. For pharmacy students and other undergraduates. Prerequisite: 401 or permission of instructor. Offered: W.

PHCOL 403 General Pharmacology III (3/4)
Beavo, McKnight General pharmacology of drugs affecting the endocrine and cardiovascular systems. For pharmacy students and other undergraduates. Prerequisites: 401, 402, or permission of instructor. Offered: Sp.

PHCOL 434, 435 General Pharmacology (2,2)
Halpern, Watson Lectures and demonstrations concerning the action of drugs on physiological and pathological processes with special emphasis on agents of special importance in the practice of dentistry. For dental students. Offered: A, W.

PHCOL 498 Undergraduate Thesis (*) Prerequisite: permission of instructor. Offered: A.

PHCOL 499 Undergraduate Research (*) Participation in departmental research projects. Prerequisite: permission of instructor. Offered: A.

PHCOL 507 Pharmacology Seminar (1) Presentation of comprehensive reports on recent medical and scientific literature in fields of current importance. Research progress reports, and reports on results of completed research. Registration limited to pharmacology students; lectures are open to the public. Offered: A.

colony students; lectures are open to the public. Offered: A.

PHCOL 511 General Pharmacology I (1-6)
Juchau, Storm Consideration of principles governing drug-receptor interactions, dose-effect relationships, drug absorption, distribution, metabolism, and excretion. Introduction to drug toxicity, tolerance, allergy, and drug-induced mutagenesis and carcinogenesis. Drugs utilized as antimicrobial agents and cancer chemotherapeutic agents. Prerequisites: graduate standing, organic chemistry, biochemistry, and introductory anatomy and physiology. Offered: A.

PHCOL 512 General Pharmacology II (1-5)
Chavkin, Nathanson General pharmacology of drugs affecting the autonomic and central nervous systems. Emphasis on current research approaches to understanding the basic mechanisms of drug action. For graduate students. Prerequisite: 511 or permission of instructor. Offered: W.

PHCOL 513 General Pharmacology III (1-5)
Beavo, McKnight General pharmacology of drugs affecting the endocrine and cardiovascular systems. Prerequisites: 511, 512, or permission of instructor. Offered: Sp.

PHCOL 514 Current Topics in Pharmacology (1)
McKnight Current research related to the mechanisms of drug action presented in a seminar format. Presentations include relevant background material as well as detailed experimental results taken from current research articles. Open to medical and graduate students. Prerequisite: permission of instructor. Offered: AWSp.

PHCOL 515 General Pharmacology Laboratory (*, max. 9) Laboratory course for professional and graduate students who wish to do independent laboratory research under the direction of a specific faculty member. Prerequisite: permission of instructor. Offered: AWSp.

PHCOL 519 Introduction to Laboratory Research in Pharmacology (4)
Krebs On a rotation basis students carry out individual research projects in the laboratories of different faculty members. At the end of each quarter they make formal presentations of their work. For first year graduate students in pharmacology. Offered: AWSps.

PHCOL 527 Drug Metabolism (3)
Juchau, Nelson Considerations of the biochemical mechanisms for the biotransformation of drugs and foreign compounds. Open to medical and graduate students. Prerequisite: one year graduate, medical, or dental biochemistry, or permission of instructor. Offered: jointly with MEDCH 527; odd years; W.

PHCOL 528 Neuropsychopharmacology (2)
Halpern, Horita Advanced review and discussion of biochemical and pharmacodynamic mechanisms underlying the central nervous system actions of psychotropic, analgesic, sedative, and antiepileptic drugs. Prerequisites: 511, 512, 513, or permission of instructor. Offered: even years; A.

PHCOL 529 Membrane Pharmacology (2)
Catterall, Nathanson, Tempel, Vincenzi Advanced consideration of the fundamental properties of biological membranes and the mechanisms of drug and hormone action on enzymes, drug and hormone receptors, and ion transport systems in the plasma membrane of cells. Prerequisites: 511, 512, 513, BIOC 440, 441, or 531 or permission of instructor. Offered: even years; W.

PHCOL 530 Pathways of Receptor Action (2)
Beavo, Krebs, Storm Advanced consideration of the molecular events between drug or hormone binding to receptors and the resulting responses. Roles played by cyclic nucleotides and other second messengers. Adenylate cyclase, phosphoinositide-mediated regulation, phosphodiesterases and protein kinases. Prerequisites: 511, 512, 513, or permission of instructor. Offered: even years; Sp.

requisites: 511, 512, 513, or permission of instructor. Offered: odd years; A.

PHCOL 531 Control of Gene Expression (2)
McKnight, Moon Advanced discussion of hormone-receptor interactions, structure of active genes, molecular events leading to altered gene expression, posttranscriptional and posttranslational mechanisms of regulating protein abundance and assembly into subcellular structures. Prerequisite: permission of instructor. Offered: odd years; Sp.

PHCOL 533 Molecular Toxicology (2)
Kavanagh, Omiecinski Advanced discussion of molecular mechanisms whereby chemical, physical, and biological agents produce their harmful effects on biological tissues. Prerequisites: permission of instructor. Offered: jointly with ENV H 533; even years; Sp.

PHCOL 534 Regulation of Neurotransmission (2)
Chavkin, Dorsa Advanced consideration of the effects of drugs on neurotransmission including current topics in receptor pharmacology, transmitter release and reuptake mechanisms, synaptic plasticity, and neurodegeneration. Prerequisites: 511, 512, or permission of instructor. Offered: even years; Sp.

PHCOL 549 Concepts in Pharmacology (2)
Reading and participatory discussions of publications on fundamental concepts in pharmacology and development of concepts to present. Includes receptors, theories of receptor activation, chemical transmission, membrane potential, membrane responsiveness, transmembrane signaling, membrane ion pumps, voltage-operated channels, and drug absorption, distribution, metabolism, and elimination. Prerequisites: 511, 512, and 513 or permission.

PHCOL 550 An Overview of Faculty Research (1)
Reviews research topics currently being studied in pharmacology. Student reads articles published on each topic. Credit/no credit only. Prerequisite: first-year student standing in pharmacology. Offered: A.

PHCOL 580 Regulation of Cell Function by Cyclic Nucleotide Phosphodiesterases (1)
Discussion of research strategies, methodologies, and literature relating to regulation of cyclic nucleotide levels in the cell. Emphasis on practical problem solving, data analysis, and presentation of methods important to understanding published data and designing new experiments. Credit/no credit only. Prerequisite: permission of instructor. Offered: AWSps.

PHCOL 561 Molecular Properties of Ion Channels (1)
Discussion of research strategies, methodologies, and literature concerning the structure, function, and regulation of sodium and calcium channels and the mechanism of action of drugs on them. Emphasis on experimental problem solving, data analysis, and presentation. Prerequisite: permission of instructor. Credit/no credit only. Offered: AWSps.

PHCOL 562 Regulation of Synaptic Physiology (1)
Discussion of research strategies and methodologies involved in the regulation of signal transduction and synaptic physiology. Emphasis on practical problem solving, data analysis, and presentation methods. Prerequisite: permission of instructor. Credit/no credit only. Offered: AWSps.

PHCOL 563 Developmental Toxicology (1)
Presentation of theory and techniques with highest priority given to current literature and research advances. Emphasis on mechanisms whereby drugs and other foreign organic chemicals affect dysmorphogenesis, functional abnormalities, and other types of permanent and semi-permanent embryotoxic effects. Prerequisite: permission of instructor. Credit/no credit only. Offered: AWSps.

PHCOL 564 Cellular Regulation by Protein Kinases (1)
Analysis of research problems, techniques, and emerging concepts in study of the function of protein kinases. Emphasis on critical evaluation of research and development of presentation skills. Prerequisites: 511, 512, 513, or permission of instructor. Offered: even years; Sp.

requisite: permission of instructor. Credit/no credit only. Offered: AWPSP.

PHCOL 565 Intercellular Signaling in Development (1) Molecular genetic approaches to dissecting the roles and mechanisms of intracellular signaling during development. Emphasis on vertebrate genes related to *Drosophila* segment polarity genes. Prerequisite: permission of instructor. Credit/no credit only. Offered: AWPSP.

PHCOL 566 Molecular Pharmacology of Neurotransmitter and Neurokinin Receptors (1) Discussion of research strategies and methodologies in the areas of molecular neurobiology and signal transduction of muscarinic receptors, G-proteins, and neurokinin receptors. Emphasis on practical problem solving, data analysis, and presentation methods important to modern scientific work. Prerequisite: permission of instructor. Credit/no credit only. Offered: AWPSP.

PHCOL 567 Signal Transduction Mechanisms in Neuroplasticity and Neuron Growth (1) Discussion of research strategies, methodologies, and literature relating to signal transduction mechanisms important for neuroplasticity and regulation of neuron growth in the central nervous system. Emphasis on practical problem solving, data analysis, and presentation methods important to modern scientific work. Prerequisite: permission of instructor. Credit/no credit only. Offered: AWPSP.

PHCOL 568 Pharmacology of Free Radicals (1) Advanced considerations of current literature and of experimental design, implementation and interpretation of research dealing with the effects of reactive oxygen species and free radicals on cell membranes and cells. Discussion of relationships of such phenomena to human disease and the effects of drugs thereon. Prerequisite: permission of instructor. Credit/no credit only. Offered: AWPSP.

PHCOL 569 Molecular Genetics of Potassium Channel Function (1) Discussion of research strategies, methodologies, and literature concerning the structure, function, and regulation of potassium channel genes and their role in behavior as studied in mutant mice. Emphasis on experimental problem solving, data analysis, and presentation. Credit/no credit only. Prerequisite: permission of instructor.

PHCOL 570 Molecular Pharmacology of Neurotransmission (1) Discussion of research strategies, methodologies, and literature concerning the structure, function, and regulation of neurotransmitter genes and the mechanism of action of drugs and hormones on their expression. Emphasis on experimental problem solving, data analysis, and presentation. Credit/no credit only. Prerequisite: permission of instructor.

PHCOL 600 Independent Study or Research (*) Pharmacology graduate students only. Offered: AWPSP.

PHCOL 697P Pharmacology Special Electives (*) By specific arrangement, for qualified students, special clerkship, externship, or research opportunities can at times be made available at institutions other than the University of Washington. The faculty can advise student of opportunities. Students electing this course should obtain from the Dean's office a special assignment form at least one month before preregistration. Offered: AWPSP.

PHCOL 700 Master's Thesis (*) Pharmacology graduate students only. Offered: AWPSP.

PHCOL 800 Doctoral Dissertation (*) Pharmacology graduate students only. Offered: AWPSP.

Physiology and Biophysics

G424 Health Sciences

Physiology deals with the processes, activities, and phenomena incidental to, and characteristic of, life and living organisms. Based upon physics, chemistry, and mathematics, physiology interlocks closely with the other basic medical sciences—anatomy, molecular biology, immunology, biochemistry, pharmacology, and pathology—and with psychology. Research in physiology is accomplished by analyzing the molecular, cellular, and integrative properties of the system under study. For this reason, physiology appeals to students with diverse backgrounds and goals. Courses in this field are given for medical, dental, pharmacy, nursing, and graduate students.

Graduate Program

The Department of Physiology and Biophysics offers advanced instruction and training leading to both the Master of Science and Doctor of Philosophy degrees. Students aspiring only to the M.S. degree are rarely accepted. Students pursuing a Ph.D. degree in physiology and biophysics may emphasize either molecular and cellular physiology, biophysics, neurobiology, cardiovascular-respiratory physiology, or endocrinology. Studies leading to the doctoral degree require five to six years. The first year is spent in acquiring a broad knowledge of physiology by means of a sequence of courses and laboratory rotations. After selection of a special area of study, the second year is spent taking advanced seminars in the area of specialization and developing a thesis proposal. After admission to candidacy, the latter years are spent in pursuing the area in depth and completing an original research project.

The department participates in interdisciplinary Ph.D. degree programs in Neurobiology and Behavior and in Molecular and Cellular Biology (see the Interschool or Intercollege Programs section of this catalog for a description of these programs).

Special Requirements

Admission to the physiology program normally requires a baccalaureate degree in biology, molecular biology, genetics, biochemistry, physics, mathematics, psychology, engineering, or chemistry.

Graduate Record Examination scores are required as part of the application.

Students are normally admitted to the graduate program in the autumn quarter. Applications and all relevant material should be submitted by February 1.

Research Facilities

The department is well equipped to provide instruction and research training in cellular and molecular physiology, neurobiology, membrane biophysics, cardiovascular physiology, respiratory physiology, muscle biophysics, temperature regulation, endocrinology, reproduction, and physiological psychology. The facilities of the Regional Primate Research Center, adjacent to the department, are available to qualified trainees who need to use primates in their research.

Correspondence and Information

Graduate Program Coordinator
Department of Physiology and Biophysics, Box 357290

Faculty

Chair

Wayne E. Crill

Professors

Anderson, Marjorie E. * 1971; PhD, 1969, University of Washington; physiology of basal ganglia and cerebellum.

Berger, Albert J. * 1978; MA, 1965, PhD, 1967, Princeton University; PhD, 1976, University of California (San Francisco); neural and chemical control of respiration.

Binder, Marc D. * 1978; PhD, 1974, University of Southern California; organization of spinal reflexes.

Blinks, John R. * 1990; MD, 1955, Harvard University; muscle calcium.

Bothwell, Mark A. 1985; PhD, 1975, University of California (Berkeley); molecular and cellular physiology of nerve growth factors.

Brengelmann, George L. * 1966; PhD, 1967, University of Washington; temperature regulation, cutaneous blood flow.

Crill, Wayne E. * 1967; MD, 1962, University of Washington; properties of cortical neurons.

Detwiler, Peter B. * 1977; PhD, 1970, Georgetown University; physiology of photoreceptors.

Feigl, Eric O. * 1969; MD, 1958, University of Minnesota; cardiovascular physiology, coronary and cerebral circulation.

Fetz, Eberhard * 1975; PhD, 1966, Massachusetts Institute of Technology; cortical regulation of movement.

Freund, Peter 1980, (Adjunct); MA, 1971, Brown University; MD, 1975, Columbia University; temperature regulation, vasomotor control, physiology/biophysics.

Fuchs, Albert F. * 1969; PhD, 1966, Johns Hopkins University; oculomotor physiology.

Gordon, Albert M. * 1964; PhD, 1961, Cornell University; skeletal muscle physiology.

Hildebrandt, Jacob * 1966; PhD, 1966, University of Washington; respiratory physiology.

Hille, Bertil * 1968; PhD, 1967, Rockefeller University; ion channels of excitable membranes.

Hlastala, Michael P. * 1972; PhD, 1969, State University of New York (Buffalo); respiratory physiology, inert gas analysis of respiratory function.

Hornbein, Thomas F. * 1963; MD, 1956, Washington University; physiology, biophysics.

Kennedy, Thelma T. * 1958, (Emeritus); PhD, 1955, University of Chicago.

Koerker, Donna J. * 1982; PhD, 1970, University of Michigan; endocrinology, intermediate metabolism of carbohydrates.

Kushmerick, Martin J. * 1988; MD, 1963, PhD, 1966, University of Pennsylvania; muscle contraction, magnetic resonance, metabolic imaging NMR spectroscopy.

Patton, Harry D. 1947, (Emeritus); PhD, 1943, MD, 1946, Yale University.

Ransom, Bruce Robert * 1995, (Adjunct); MD, 1972, PhD, 1972, Washington University; neurology, neuroscience research.

Rowell, Loring B. * 1963; PhD, 1962, University of Minnesota; regulation of blood flow, exercise physiology.

Rubel, Edwin W. * 1986; PhD, 1969, Michigan State University; developmental neurobiology, with special emphasis on vertebrate auditory system development.

Scher, Allen M. * 1950, (Emeritus); PhD, 1951, Yale University.

Schwartzkroin, Philip A. * 1978; PhD, 1972, Stanford University; mechanisms of cortical excitability.

Schwindt, Peter C. * 1974; PhD, 1972, University of Washington; properties of spinal and cortical neurons, mechanisms of repetitive firing and convulsive activity.

Smith, Orville A. * 1958; PhD, 1953, Michigan State University; central regulation of cardiovascular function.

Stahl, William L. * 1967; PhD, 1963, University of Pittsburgh; neurochemistry of brain ATPase systems.

Steiner, Robert A. * 1977; PhD, 1975, University of Oregon; neuroendocrinology.

Stirling, Charles E. * 1968; PhD, 1966, State University of New York (Upstate); epithelial transport mechanisms.

Teller, Davida Y. * 1965; PhD, 1965, University of California (Berkeley); vision, color vision, development of vision in infants.

Towe, Arnold L. * 1953, (Emeritus); PhD, 1953, University of Washington.

Van Citters, Robert L. * 1962; MD, 1953, University of Kansas; cardiovascular physiology.

Winn, H. Richard * 1983, (Adjunct); MD, 1968, University of Pennsylvania; physiology of cerebral blood flow regulation.

Associate Professors

Carlson, Steven S. * 1985; PhD, 1975, University of California (Berkeley); molecular and cellular physiology of synaptic transmission.

Cunningham, Susanna L. * 1978, (Adjunct); MN, 1969, PhD, 1978, University of Washington; risk factors for atherosclerotic cardiovascular disease.

Howard, Jonathon * 1989; PhD, 1983, Australian National University; biophysics of molecular motors.

Kroll, Keith * 1987, (Adjunct Research); PhD, 1983, University of Washington; regulation of energy balance in the heart.

Landau, Barbara R. 1962, (Emeritus); MS, 1949, PhD, 1956, University of Wisconsin.

Skahen, Julia G. 1941, (Emeritus); MS, 1928, University of Washington; PhD, 1941, University of Chicago.

Spain, William * 1987; MD, 1977, Columbia University; signal transduction in the central nervous system.

Assistant Professors

Giniger, Edward Scott * 1994, (Research); PhD, 1988, Harvard University; neural development, mechanism of axon guidance, genetic specification of brain structure.

Mackie, Kenneth P. 1987, (Adjunct); MD, 1984, Yale University.

Shadlen, Michael N. 1995; PhD, 1985, University of California (Berkeley); MD, 1988, Brown University; visual perception.

Wordeman, Linda * 1994; PhD, 1988, University of California (Berkeley); mitosis and myofibril formation.

Zagotta, William N. * 1993; PhD, 1989, Stanford University; molecular mechanisms of ion channel function.

Lecturers

Linder, Thomas M. 1982; PhD, 1971, University of Washington.

Peterman, Annie K. 1989; PhD, 1987, University of Washington.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

CONJ 340, 341, 342 Human Anatomy and Physiology (4, 4, 4) Linder, Peterman See Conjoint Courses. Offered: A, W, Sp.

P BIO 405-406 Human Physiology (4-4) Feigl, Stirling Intensive coverage of physiology through lectures, conference. Winter Quarter: excitable tissue, skeletal muscle; spinal reflex; cardiovascular, respiratory physiology; acid base balance; autonomic nervous system; temperature regulation. Spring Quarter: renal, body fluids; neuroendocrinology; reproductive, gastrointestinal, neurophysiology. Required for dental, graduate nursing, and bioengineering students. Also offered for graduate students. Offered: W-Sp.

P BIO 424 Vision and Its Physiological Basis (5) NW Behavioral neurobiology of human vision: color vision, acuity and spatial vision, light and dark adaptation, visual development. Correlation of visual functioning with known optical, biochemical, physiological, and anatomical substrates. Recommended: some background in physical or biological science or engineering. Offered: jointly with PSYCH 424.

P BIO 498 Undergraduate Thesis (*) For medical students. Prerequisite: permission of instructor. Offered: AWSpS.

P BIO 499 Undergraduate Research (*) For medical students. Prerequisite: permission of instructor. Offered: AWSpS.

CONJ 501, 502, 503 Molecular Basis of Cell Function (3,3,3) Plasma membrane (501), including membrane structure, ion channels, transmembrane signaling; nucleus (502), including chromatin structure, recombination, RNA processing and gene expression; and cytoplasm (503), including protein synthesis targeting and secretion, organelles, extracellular matrix, higher-order cell functions. Prerequisites: introductory biochemistry or permission of instructors. Physiology/Biophysics responsible. Offered: A, W, Sp.

P BIO 503 Physiological Instrumentation (4) Feitz, Schwindt Introduction to linear systems and electronic circuits. Topics include basic circuit theory; step and sinusoidal response of first- and second-order linear systems (RLC circuits, mechanical and hydraulic systems); bode plots; Fourier analysis; operational amplifier circuits. Associated laboratory exercises. Prerequisites: beginning calculus, permission of instructor. Offered: 1995; S.

P BIO 505 Nerve, Muscle, Synapse (2) Berger Fundamental electrophysiology of single neurons, synapses, physiology of skeletal muscle cells and simple reflexes. Emphasis on cellular concepts. For first-year graduate students in biomedical graduate research and interdisciplinary programs who are interested in learning how neurons and muscle cells function and interact. Offered: A.

P BIO 506 Neurophysiology (3) Binder Properties of neurons, processing of synaptic inputs, analysis of sensory and motor systems, and higher functions of the vertebrate central nervous system. Offered: Sp.

P BIO 507 Cardiovascular, Renal, Respiratory Physiology (3) Berger Cardiovascular physiology: the heart, microcirculation, hemodynamics, regional circulation, and reflex integration. Renal physiology: osmolarity, volume, and ion transport. Respiratory physiology: the lung, pulmonary circulation, alveolar ventilation, gas exchange, control of breathing, acid-base regulation, exercise. Offered: W.

P BIO 508 Introduction to Laboratory Research in Physiology (2-5) Students participate in the performance of ongoing projects in designated research laboratories. Emphasis is on experimental design,

methodology and techniques. For first- and second-year graduate students in physiology and biophysics to provide a basis for future independent research. Offered: AWSpS.

P BIO 509 Neuroendocrinology (3) Steiner Emphasizes the cellular and molecular aspects of several topics in neuroendocrinology, including neuropeptide genes, reproduction, steroid hormone regulation of gene expression, mechanisms of hormone action, endocrine rhythms and neural oscillators. Prerequisites: BIOL 200,202,202; BIOC 440,441,442. Offered: Sp.

CONJ 511 Functional Neuroanatomy (4) See Conjoint Courses. Offered: W.

P BIO 515 Neurophysiology Proseminar (2) Guided survey of the experimental neurobiology literature. Course conducted as seminar, with discussion of assigned papers. Prerequisite: permission of instructor. Offered: AWSp.

P BIO 516 Physiological Proseminar (7) Hlastala Guided survey of the experimental literature in cardiovascular and respiratory physiology. Course conducted as seminar with oral analysis of assigned papers and topics. Prerequisite: permission of instructor. Offered: A.

P BIO 518 Research Topics in Cardiovascular Physiology (1) Feigl Graduate students and faculty members present and discuss current literature and research. Prerequisite: permission of instructor.

P BIO 519 Membrane and Muscle Biophysics Seminar (1) Hille Detailed discussion and study of current topics in cell membrane function and muscle contraction. Credit/no credit only. Prerequisite: permission of instructor. Offered: Sp.

CONJ 518 Molecular and Cellular Neurobiology (3) Bothwell, Carlson Concepts and techniques of molecular and cell biology as applied to understanding development and function of the nervous system. Recommended: biochemistry course or equivalent. Coordinator: Department of Physiology and Biophysics. Offered: A.

P BIO 520 Physiology Seminar (*) Selected topics in physiology. Prerequisite: permission of instructor.

P BIO 521 Biophysics Seminar (*) Selected topics in biophysics. Prerequisite: permission of instructor.

P BIO 522 Selected Topics in Respiratory Physiology (1-3) Hildebrandt Advanced seminar on selected topics, including pulmonary mechanics, gas exchange, lung fluid balance, regulation of breathing, pulmonary circulation, respiration in the neonate, liquid breathing, airway dynamics, lung structure and development, cardiopulmonary interactions, exercise physiology. Prerequisite: permission of instructor. Offered: AWSpS.

P BIO 523 Heat Transfer and Temperature Regulation (2-5) Brengelmann Thermal exchange between the body surface and the environment. Heat production and distribution within the body. Properties of cutaneous and deep temperature receptors. Neural integration and homeothermy. Prerequisite: permission of instructor. Offered: Sp.

P BIO 525, 526, 527 Readings in Advanced Physiology and Biophysics (*, *, *) Guided study of the experimental literature of physiology and biophysics. Essays are written and discussed with the staff. Emphasis is placed on critical analysis, accuracy of expression, bibliographical technique, and other factors of good scholarship. Prerequisite: permission of instructor. Offered: AWSpS.

P BIO 539 Sensory Systems I (3) Reading and analysis of primary sources in sensory neurophysiology. Receptor mechanisms and the somatosensory

system are covered. Prerequisites: 506 and CONJ 511 or equivalent.

P BIO 541 Motor Systems I: Peripheral Mechanisms (3) *Binder* Critical reading and discussion of research papers on the current physiology of the motor unit, afferent inputs and segmental interneurons that control motor units. Prerequisites: 506 and CONJ 511 or equivalent and permission of instructor. Offered: 1996; W.

P BIO 542 Motor Systems II: Brainstem Mechanisms (3) *Anderson, Fuchs* Critical discussion of research papers and resulting concepts regarding the roles of various brainstem systems in controlling somatic and ocular movements. Prerequisites: 506 and CONJ 511 or equivalent and permission of instructor.

P BIO 543 Motor Systems III: Cerebral Cortex and Cerebellum (3) *Fetz* Critical reading and discussion of classical and current papers on motor and premotor cortex, corticospinal system; cerebellar circuitry and function, and cerebrocerebellar relations. Prerequisites: 506 and CONJ 511 or equivalent and permission of instructor.

P BIO 544 Properties of Neurons (3) *Schwindt* Critical reading and discussion of papers on passive, active, and integrative properties of single invertebrate and mammalian neurons. Provides understanding of how a variety of cellular mechanisms contribute to neuronal discharge patterns. Prerequisites: 506, 515, and CONJ 511 or equivalent and permission of instructor. Offered: even years; A.

P BIO 547 Readings in Cell Physiology (2/3, max. 15) *Hille* Reading and discussion of research literature on excitable cells. Emphasis on membrane excitability, transport, contractility, growth factors, and extracellular matrix. A literature research paper may be written for additional credit. Prerequisites: 506 and CONJ 511 or equivalent. Offered: W.

P BIO 549 Plasticity in the Vertebrate Nervous System (2) *Schwartzkroin* Emphasis on mammalian CNS. Examples of anatomical, pharmacological plasticity chosen from literature. Structure changes during development and in adult (hippocampus, spinal cord, nerve-muscle) studied and as correlates of learning. Students responsible for leading class discussion of one topic. Credit/no credit only. Prerequisites: graduate-level courses in neurophysiology and neuroanatomy; understanding of basic neuronal mechanisms. Offered: even years; Sp.

P BIO 550 Cortical Potentials (4) Properties of continuous and evoked potentials and their interactions, including the biophysics of their cellular origin. Prerequisites: 516 and permission of instructor.

P BIO 559 Integrative Neurophysiology (3) Interpretation of neurophysiological phenomena from comparative, biophysical, and evolutionary standpoints. Prerequisite: permission of instructor.

P BIO 560 Muscle and Cell Motility (*) *Gordon* Selected topics in muscle contraction and cell motility. Reading of original papers. Presentations by students and faculty. Credit/no credit only. Prerequisite: permission of instructor.

P BIO 594 Neurological Study Unit (0.5) *Spain* Faculty and student discussion of neurological topics illustrated with clinical cases or demonstrations include the following: physiology, neuroanatomy, neurology, neuropathology, neurosurgery, and psychiatry. Credit/no credit only. Prerequisite for medical students: HUBIO 532P. Offered: AW.

P BIO 600 Independent Study or Research (*) Offered: AWSp.

P BIO 700 Master's Thesis (*) Offered: AWSp.

P BIO 800 Doctoral Dissertation (*) Offered: AWSp.

Psychiatry and Behavioral Sciences

BB1644 Health Sciences

The department offers course work, clinical training, and research opportunities for undergraduate students, medical students, graduate physicians, and graduate students in allied health programs such as psychology, social work, and psychiatric nursing.

A biobehavioral approach is emphasized, which incorporates intrapersonal, interpersonal, and sociocultural factors. Intrapersonal factors include emotion, perception, cognition, psychodynamics, neurochemistry, neuroanatomy, neurophysiology, and the developmental and aging processes. Interpersonal factors focus upon dyadic, familial, and group interactions. Sociocultural factors include the cultural, social, institutional, and community systems as well as the environment and epidemiology of health and disease.

Undergraduate Program

Contact: Gary Tucker, Chair, Undergraduate Education
Ed Walker, Nicholas Ward, Pre-clinical Curriculum
Rebecca Jones, Maryonda Scher, Clinical Clerkships

A variety of courses in the behavioral sciences and psychiatry are available to medical students. Included among these are psychosocial growth and development, including aging and adult development, preventive methods for mental health, cross-cultural mental health, clinical psychiatry, and behavioral medicine.

Graduate Program

The medical school curriculum is divided into a core (basic) curriculum and an elective curriculum. Within its core curriculum the Department of Psychiatry and Behavioral Sciences offers material covering learning theory, cognition, memory, perception, neuropharmacology, social growth and development, epidemiology of health and disease, psychopathology, psychotherapy, and neuropsychiatry and behavioral medicine, as well as training in interviewing skills and assessment techniques. Its elective program includes a variety of clinical experiences and advanced didactics and seminars designed to further the knowledge and skills developed within the basic curriculum. In addition, the department encourages research and other scholarly pursuits by students in areas of interest to them. Stipends are available for research studies.

Residency Training in Psychiatry

Contact: Johan Verhulst

A four-year residency for medical school graduates and a three-year post-internship residency prepares physicians for Specialty Board Certification in Psychiatry. Clinical rotations on various inpatient, outpatient, and consultation/liaison services are augmented by individual supervision and didactic lectures. With the program's integrative orientation, residents become proficient in psychotherapy, psychopharmacology, and community liaison with patients of all ages. Fellowships in child, geriatric, and community psychiatry are available, as well as in substance abuse and various other specialty areas.

Clinical Psychology Internship Program

Contact: Joseph Becker

A one-year internship in clinical psychology approved by the American Psychological Association is offered as an interdepartmental program. This internship is

open to candidates for the doctorate in clinical psychology from graduate programs approved by the American Psychological Association.

Postdoctoral Fellowship Training

Contact: Brenda Townes, Richard Veith

Postdoctoral fellowships for advanced clinical and research training in behavioral medicine, broadly construed, are also offered.

Faculty

Chair

Gary J. Tucker

Professors

Becker, Joseph * 1965, (Emeritus); PhD, 1958, Duke University; clinical personality psychopathology.

Bird, Thomas D. 1976, (Adjunct); MD, 1968, Cornell University; neurology.

Bowden, Douglas M. 1969; MD, 1965, Stanford University.

Calsyn, Donald 1981; PhD, 1979, University of Washington; educational psychology.

Carr, John E. * 1963; PhD, 1963, Syracuse University; clinical psychology, cross-cultural psychopathology.

Chapman, C. Richard * 1971; PhD, 1969, University of Denver; human pain measurement, psychophysiology, sensation and perception, chronic pain.

Dikmen, Sureyya S. * 1974, (Adjunct); PhD, 1973, University of Washington; clinical neuropsychology, neuropsychological and psychosocial outcomes in traumatic head injury.

Dodrill, Carl B. 1973; MS, 1967, PhD, 1970, Purdue University; human neuropsychology, epilepsy, EEG and performance, antiepileptic medications and performance.

Doerr, Hans O. * 1967, (Emeritus); PhD, 1965, Florida State University; psychophysiology of central and autonomic nervous systems, neuropsychology.

Donovan, Dennis 1981; MA, 1972, Western Washington University; PhD, 1980, University of Washington; cognitive-behavioral factors in substance abuse and addictive behaviors.

Dorsa, Daniel M. * 1981; PhD, 1977, University of California (Davis); neuropharmacology, neurochemistry.

Dunner, David L. 1978; MD, 1965, Washington University.

Dworkin, Samuel F. * 1974; DDS, 1958, PhD, 1969, New York University; dentistry and clinical psychology, pain, psychosomatic and illness-related behavior.

Hampson, John L. 1960, (Emeritus); MD, 1946, Johns Hopkins University.

Heiman, Julia R. * 1980; PhD, 1975, State University of New York (Stony Brook); sexuality and sexual relationships, prevention and treatment of family abuse.

Horita, Akira * 1950; PhD, 1954, University of Washington; neuropsychopharmacology.

Hunt, D. Daniel 1977; MD, 1973, Cornell University; MBA, 1977, University of Pennsylvania.

Johnson, Merlin 1982, (Emeritus); MD, 1947, University of Iowa.

Katon, Wayne J. 1976; MD, 1976, University of Oregon.

Kogan, Kate L. 1957, (Emeritus); MA, 1935, PhD, 1943, Columbia University.

Linehan, Marsha M. * 1977, (Adjunct); PhD, 1971, Loyola University (Chicago); personality disorders, in-

cluding borderline; suicidal behaviors, cognitive and behavior therapies.

Martin, Donald C. * 1972, (Adjunct); MS, 1961, PhD, 1968, Florida State University; statistical computing, randomization tests, approximations for probability functions.

Martin, Joan C. * 1972; PhD, 1965, Florida State University.

Meltzoff, Andrew N. * 1984, (Adjunct); PhD, 1976, Oxford University (UK); cognitive and social development of human infants.

Prinz, Patricia * 1976; PhD, 1969, Stanford University; pharmacology.

Raskind, Murray 1970; MD, 1968, Columbia University.

Robinson, Nancy M. * 1969; PhD, 1958, Stanford University; psychology.

Rothenberg, Michael B. 1967, (Emeritus); MD, 1954, Case Western Reserve University; psychiatry and behavioral sciences.

Roy-Byrne, Peter 1986; MD, 1978, Tufts University.

Schwartz, Pepper J. * 1972, (Adjunct); PhD, 1974, Yale University; family, gender, human sexuality, field methods.

Spain, David H. * 1968, (Adjunct); PhD, 1969, Northwestern University; psychocultural anthropology, African studies, research methods.

Streissguth, Ann P. 1972; MA, 1959, University of California (Berkeley); PhD, 1964, University of Washington; psychology.

Strother, Charles R. 1947, (Emeritus); MA, 1932, University of Washington; PhD, 1935, University of Iowa; mental retardation, psychopathology, speech pathology.

Teri, Linda 1984; PhD, 1980, University of Vermont; clinical psychology.

Townes, Brenda D. * 1961; PhD, 1970, University of Washington; psychology.

Trupin, Eric W. 1973; MA, 1973, PhD, 1974, University of Wyoming; psychology.

Tucker, Gary J. 1985; MD, 1960, Case Western Reserve University.

Turner, Judith A. 1980; MA, 1975, PhD, 1979, University of California (Los Angeles); psychology.

Velth, Richard 1977; MD, 1973, University of Washington.

Vitaliano, Peter P. * 1978; PhD, 1975, Syracuse University.

Vitiello, Michael V. * 1982; PhD, 1980, University of Washington; behavioral medicine, principles of behavioral sciences applied to medical research and practice.

Ward, Nicholas G. 1975; MD, 1973, Cornell University.

Associate Professors

Armstrong, Hubert E. 1966; PhD, 1963, Syracuse University; clinical psychology.

Avery, David H. 1980; MD, 1972, Washington University.

Barnes, Robert 1977; MD, 1973, University of Utah.

Borson, Soo 1972; MD, 1969, Stanford University.

Carlin, Albert S. 1964; MA, 1961, PhD, 1964, Syracuse University; clinical psychology.

Chaney, Edmund 1977; PhD, 1976, University of Washington; clinical psychology.

Cowley, Deborah S. 1982; MD, 1980, University of Pennsylvania.

Craft, Suzanne 1994, (Research); PhD, 1985, University of Texas (Austin).

Dager, Stephen R. 1979; MD, 1978, University of Nebraska.

Dubach, Mark F. 1978; PhD, 1983, University of Washington; anthropology.

Egan, Kelly J. 1980; MA, 1968, Texas Technological University; PhD, 1980, University of Washington; clinical psychology.

Erickson, Richard C. 1991; PhD, 1969, University of Washington; clinical psychology.

Hamblin, Mark W. 1990; MD, 1982, PhD, 1982, University of California (San Diego).

Kivlahan, Daniel R. * 1983; PhD, 1983, University of Missouri; evaluating assessment, prevention, and treatment approaches for addictive behaviors.

Lampe, Thomas H. 1982; MD, 1977, Indiana University.

Maiuro, Roland D. 1978; PhD, 1978, Washington University; clinical psychology.

Maxim, Peter E. 1976; MD, 1966, PhD, 1971, Stanford University.

McCann, Barbara S. 1986; MS, 1982, PhD, 1984, Rutgers University; psychology.

McCauley, Elizabeth 1979; PhD, 1973, State University of New York (Buffalo); clinical and developmental psychology.

McFall, Miles E. 1982; MA, 1979, PhD, 1981, University of Montana; clinical psychology.

Miller, Margaret A. 1981; PhD, 1984, University of Washington.

Murburg, Michele 1982; MD, 1978, Albert Einstein College of Medicine.

Peskind, Elaine R. 1986; MD, 1986, University of Washington.

Raskind, Wendy H. 1981, (Adjunct); PhD, 1977, MD, 1978, University of Washington; medical genetics.

Ries, Richard K. 1975; MD, 1975, Northwestern University.

Romano, Joan 1982; MS, 1974, PhD, 1982, University of Pittsburgh; clinical psychology.

Saxon, Andrew J. 1982; MD, 1977, Tufts University.

Scher, Maryonda 1981; MD, 1954, University of Washington.

Scott, David T. 1993; PhD, 1978, Yale University.

Speltz, Matthew L. 1981; MA, 1975, Western Washington University; PhD, 1980, University of Missouri; developmental psychotherapy, family therapy, pediatric behavioral medicine.

Sullivan, Mark D. 1985; PhD, 1982, MD, 1984, Vanderbilt University.

Sulzbacher, Stephen 1976; MA, 1964, Hollins College, Virginia; PhD, 1971, University of Washington; psychiatry and behavioral sciences.

Syrjala, Karen L. 1985; PhD, 1983, MA, 1983, Boston University; clinical psychology.

Unis, Alan S. 1987; MD, 1976, University of Pittsburgh.

Varley, Christopher K. 1978; MD, 1973, University of Washington.

Verhulst, Johan 1977; MD, 1964, Catholic University of Louvain (Belgium); clinical psychology, marital therapy.

Walker, Edward A. 1983; MD, 1983, University of Washington.

Wells, Elizabeth 1990, (Research); PhD, 1984, University of Washington; clinical psychology.

Wilson, Lawrence G. 1978; MD, 1966, University of Kansas.

Womack, William M. 1969; MD, 1961, University of Virginia.

Assistant Professors

Ashleigh, E. Alexandra 1985; MD, 1985, University of California (San Francisco).

Calderon, Rosemary 1987; PhD, 1988, University of Washington.

Claypoole, Keith H. 1987; PhD, 1987, University of Wyoming.

Davis, Martha Whitfield 1989; PhD, 1988, Vanderbilt University; clinical psychology.

Dobie, Dorcas J. 1984; MD, 1984, University of Michigan; geriatric psychiatry.

Fann, Jesse R. 1993, (Acting); MD, 1989, Northwestern University; MPH, 1995, University of Washington.

Hammond, Kenric W. 1988; MD, 1974, University of California (San Diego).

Jemelka, Ron 1985; PhD, 1983, University of Texas (Austin); educational psychology.

Jensen, Carl F. 1987; MD, 1978, Vanderbilt University.

Jones, Rebecca M. 1992, (Acting); MD, 1979, State University of New York (Stony Brook).

Kohen, Ruth 1993, (Acting); MD, 1986, University of Aachen (Germany).

Logsdon, Rebecca G. 1986; PhD, 1986, Oklahoma State University.

Mariano, Anthony J. 1985; PhD, 1986, University of New Mexico.

McClellan, Jon M. 1984; MD, 1984, University of Michigan.

McCurry, Susan Melancon 1993, (Acting); PhD, 1991, University of Nevada.

McDavid, Joshua 1995, (Acting); MD, 1988, University of North Carolina; MPH, 1994, University of Pennsylvania.

McGuffin, Robert W. 1988; MD, 1973, University of Washington.

Neumaier, John F. 1983; PhD, 1989, MD, 1990, University of Washington; serotonin receptors.

Pascualy, O. Marcella 1984; MD, 1982, Universidad Javeriana (Colombia).

Petrie, Eric C. 1990; MS, 1981, University of Wisconsin; MD, 1985, University of Washington; psychopharmacology, mood disorders, neuroendocrinology, schizophrenia.

Radant, Allen D. 1985; MD, 1985, University of California (Davis).

Reoux, Joseph P. 1995, (Acting); MD, 1985, University of Texas (Houston).

Rimmele, Carl T. 1988; PhD, 1988, University of New Mexico; clinical psychology.

Rogers, Keith L. 1992; PhD, 1982, University of Iowa.

Roth-Roemer, Sari 1995, (Acting); MEd, 1988, Harvard University; PhD, 1992, Arizona State University; pain management and recovery following bone marrow transplantation.

Schmaling, Karen B. 1992; MS, 1985, PhD, 1988, University of Washington; marital interaction and depression.

Sloan, Kevin L. 1992, (Acting); MD, 1986, University of Chicago.

Srebnik, Debra S. 1993, (Acting); PhD, 1992, University of Vermont.

Szot, Patricia 1992, (Acting); PhD, 1987, Oregon State University.

Tsuang, Debby W. 1993, (Acting); MD, 1988, University of Iowa.

Uldall, Karina K. 1991, (Acting); MD, 1987, University of Missouri.

Wingerson, Dane K. 1992, (Acting); MD, 1987, University of Washington.

Wood, Peggy S. 1993, (Acting); PhD, 1992, University of Iowa.

Instructors

Brace, Melanie J. 1995, (Acting); MD, 1990, University of Michigan.

Comtois, Katherine Ann 1995, (Acting); PhD, 1992, University of Maryland.

Harris, Victoria L. 1993, (Acting); MD, 1989, University of British Columbia (Canada).

Leverenz, James B. 1992, (Acting); MD, 1985, University of Washington; neurology, psychiatry and behavioral sciences.

Rubin, Audrey 1994, (Acting); MD, 1984, University of Pennsylvania.

Shores, Molly M. 1989, (Acting); MD, 1987, University of Washington.

Unutzer, Jurgen 1994, (Acting); MA, 1988, University of Chicago; MD, 1990, Vanderbilt University.

Zaubler, Thomas S. 1995, (Acting); MD, 1991, Albert Einstein College of Medicine.

Senior Lecturer

Dagadakis, Christos S. 1976; MD, 1974, MPH, 1975, University of Washington.

Lecturers

Backus, Frank 1968; MD, 1992, University of Washington.

O'Connor, Elsa 1978; EdD, 1985, Seattle University.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Course numbers with a P suffix are not graduate courses and are restricted to medical student enrollment only.

PBSCI 451 Principles of Personality Development (2) Doerr Development of the personality from infancy through advanced age traced to its physiologic, experiential, and cultural sources with emphasis on psychodynamic concepts and behavior.

CONJ 475 Alcoholism: A Course for Medical Students in the Allied Health Sciences (2) See Conjoint Courses.

PBSCI 488 Undergraduate Thesis (*) Opportunity to complete work on psychiatric research projects or to pursue a specific psychiatric topic in depth, for instance, through library research. Prerequisite: permission of responsible faculty member. (Four or six weeks, full-time, or equivalent part-time.) Entry Code required.

PBSCI 499 Undergraduate Research (*, max. 15) Opportunities are available for participation in a wide variety of ongoing research in the behavioral sciences and clinical psychiatry, or for the development of an individual investigative project under the supervision of a faculty sponsor. Prerequisite: permission of faculty sponsor. (Two, four, six, or twelve weeks.) Entry Code required.

PBSCI 525P Forensic Issues in Mental Health (3) Goldenberg Concentration on major issues in psychiatry and law. Outside speakers from legal, judicial, and psychiatric communities. Lectures on assessment in forensic settings, competence to stand trial, and criminal responsibility. Discussions on personality disorders and correctional environments. For psychiatric residents and medical, psychiatry, psychosocial nursing, graduate psychology, social work, and law students.

PBSCI 530P Developmental Psychoanalytic Psychotherapy (2) Schimmelbusch Study of mental functioning from a developmental point of view. How failures of psychological development lead to various psychiatric pathological states and how psychoanalytic treatment reinstitutes normal development.

PBSCI 535 Modern Concepts of Psychoanalysis (2) Schimmelbusch Childhood developmental stages studied in light of inborn and environmental determinates. Correlating developmental phases with all aspects of adult personality functioning. A hierarchy of different models of the mind used to explicate personality functioning on a clinical case discussion level.

PBSCI 548P Aging and Adult Development (1-3) Aging in Western technologically advanced societies frequently involves losses in status, stamina, and economic and social supports. Consideration given to losses among the aged. Students select projects in the area of aging and work at their own levels of expertise and sophistication. Seminar format with guided reading.

PBSCI 562P Principles of Hypnosis (2) Dworkin History and theory of hypnosis. Induction techniques. Application to the treatment of emotional and physical problems. Medical and dental students. Entry Code required.

PBSCI 575P Community Psychiatry Seminar (2) Trupin Preparation for mental-health work in community agencies: cultural, social, and economic factors in mental illness and provision of services; history of community mental health; direct and indirect intervention; consultation and supervision; agency organization and leadership; psychiatric epidemiology; prevention; forensic psychiatry. Lectures, readings, case discussions.

PBSCI 591P Seminars and Conferences in Psychiatry: Seminar in Clinical Neuropsychology (*) Introduction to neuropsychological studies of brain-behavior relationships. Exposure to neuropsychological assessment procedures and manifestation of neurocognitive deficits in selected mental and medical disorders, e.g., epilepsy, AIDS, sleep disorders, trauma, toxin exposure, vascular disorders, psychiatric disorders. Develop knowledge of neuropsychological assessment procedures and applications to diverse medical conditions. Prerequisite: psychological assessment experience.

PBSCI 684P Basic Clerkship in Ambulatory Services, HC/MHC, or Clinic II (12) Decker Opportunity to experience outpatient psychiatric ambulatory services. Focus on improving interviewing skills and developing an interviewing style and content appropriate to patients with psychiatric dysfunction; gaining familiarity with psychopharmacology; exposure to problems seen in psychiatric emergency medicine. (Six weeks, full-time. Limit: two students.)

PBSCI 665P Basic Clinical Clerkship (12) Dagadakis, McDavid, Pascualy, Shores Inpatient clerkship in psychiatry. Students have primary responsibility under the direction of attending psychiatrists and residents for diagnosis and care of patients at University of Washington Medical Center, Harborview Medical Center, or Veterans Administration Hospital. Emergency room, crisis intervention, consultation to patients with psychiatric dysfunction. Familiarity with psychopharmacology and short-term hospitalization emphasized. (Six weeks, full-time.)

PBSCI 666P WAMI Psychiatry and Behavioral Sciences Clerkship (12) Rotation aims to increase student's skills in basic psychiatry, social psychiatry, transcultural psychiatry, and community psychiatry. Orientation is around the diagnosis, treatment, and clinical management of White, Aleut, Indian, and Eskimo children and adults in outpatient, inpatient, and community settings. Third-, fourth-year medical students. Prerequisite: HUBIO 563P. (Limit: three students.)

PBSCI 667P Basic Psychiatry Clerkship, Boise (12) Leone Basic psychiatry clerkship at Veterans Administration Medical Center in Boise, Idaho. Fulfills graduation requirement for clerkship in Psychiatry.

PBSCI 670P Clerkship in Consultation/Liaison Psychiatry UWMC (*, max. 24) Kalon Assessment of patients with major psychosocial problems associated with physical disease, including: problems stemming from the way the illness is perceived and experienced, liaison with other clinical disciplines on complex diagnosis and treatment of problems. Prerequisites: HUBIO 563P, 664P, 665P, 666P or 667P.

PBSCI 671P Clerkship in Consultation/Liaison Psychiatry HMC (*, max. 24) Wilson Prerequisites: HUBIO 563P, 664P, 665P, 666P or 667P.

PBSCI 672P Elective Clerkship in Primary Care Psychiatry at Boise VAMC (8/12) Blackburn, Leone, Marsh Assessment and treatment of patients with acute psychiatric problems in a primary care/rural setting. Consultation work on general medicine and surgery; assessment and dealing with outpatient psychiatric problems as they initially present. Evaluations, crisis intervention strategies, and brief therapies stressed. Prerequisites: 664P, 665P, 666P or 667P. (Four to six weeks; UW students only.)

PBSCI 673P Outpatient Psychiatry Elective (*, max. 24) Ries Offered at Harborview Outpatient Center. Students function as subinterns, conducting diagnostic interviews, initiating and managing pharmacotherapeutic treatment regimens, and providing crisis intervention, under the supervision of the full-time attending at Psychopharmacology Clinic. Prerequisite: 664P, 665P, 666P or 667P. (Four to six weeks, full-time.)

PBSCI 676P Inpatient Clerkship in Psychiatry at American Lake VA (8/12) Taylor For medical students with a defined interest in psychiatry who wish to develop their knowledge and skills in the evaluation, management, and treatment of a wide range of acute and chronic psychiatric conditions requiring inpatient hospital treatment. Prerequisite: 664P, 665P, 666P or 667P. (Four to six weeks, full-time.)

PBSCI 677P Alcohol and Drug Treatment Clerkship at American Lake VA (8/12) Lim Student assists in every phase of the substance-abuse treatment, including admission interviews, patient evaluation, problem identification, group and individual psychotherapy, assertiveness training, anger control, human sexuality, medical evaluation and treatment, couples therapy, discharge and aftercare planning. Experience primarily clinical. Prerequisite: 664P, 665P, 666P or 667P. (Four to six weeks, full-time.)

PBSCI 678P Clerkship in Psychiatric Long-Term Care and Rehabilitation (*, max. 12) Verhey, Ziemer Two-to-six-week clerkship provides learning experiences in rehabilitation of long-term psychiatric patients with medical illness. Multidisciplinary team approach, working with homeless mentally ill. Diagnostic skills emphasized. Spectrum of diseases (cardiovascular, Huntington's, organic brain syndrome) is such that physical rehabilitation is not an emphasis. Prerequisites: HUBIO 563P, 664P, 665P, 666P or 667P.

PBSCI 680P Clerkship in Emergency Psychiatry (*, max. 24) Dagadakis Emphasis on clinical evaluation, acute management, and treatment planning for individual patients. Experience in coordinating these activities with other emergency room personnel, and various hospital and community resources. Emphasis on skills useful to physicians in any specialty. Third- and fourth-year medical students only. Prerequisite: either 664P, 665P, or 666P. (Four to six weeks, full-time.)

CONJ 680P Detoxification and Rehabilitation Programs for Alcoholism and Drug Abuse (*, max. 16) Walker See Conjoint Courses. (Two, four, or six weeks, full-time; medical students only.)

PBSCI 685P Geriatric Psychiatry Clerkship (*, max. 12) *Lampe* Two-to-six-week elective. Participation in the evaluation and care of older persons with psychopathology, such as intellectual impairment and depression, in a variety of settings. Emphasis on improving clinical skills regarding diagnosis and treatment of common behavioral problems in the elderly. Prerequisite: 664P, 665P, or 666P.

PBSCI 688P Subinternship in General Psychiatry (*, max. 16) *Jones, Scher* Students function as interns under the supervision of house staff and attending psychiatrists. Further development of their diagnostic and therapeutic skills emphasized. Special areas of interest, such as family intervention, substance abuse, psychoses, neuropsychiatry, community psychiatry, administration, research pursued. Prerequisites: 664P, 665P, or 666P. (Four or six weeks, full-time.)

PBSCI 690P Clerkship in Neuropsychiatry (*, max. 24) *Neppe* Assessment of patients with possible organic causes for behavioral/psychopathological problems. Includes evaluation/management of refractory psychoses; epileptics with behavioral problems; metabolic/endocrine problems presenting psychiatrically; psychopathology caused by lesions in cerebral cortex/limbic system; psychopharmacological manipulation of underlying neurotransmitter disease. Provides student intensive exposure to neuropsychiatry. Prerequisite: 664P, 665P, or 666P. (Four, six, or eight weeks, full-time; preceptor approval required.)

PBSCI 696P Advanced Clerkship in Child Psychiatry (*, max. 24) *Varley* Provides students an opportunity to participate in evaluation and treatment. Experiences in specialized clinics are also available. It is suggested that the student contact the instructor prior to enrollment. Prerequisite: 664P, 665P, 666P. (Four or six weeks, full-time. Limit: two students.)

PBSCI 697P Psychiatry Special Electives (*, max. 24) *Scher* By special arrangement, clerkships, externships, and research opportunities can be made available at the University and other institutions. Students obtain permission from Dr. Hunt before obtaining a special assignment form from the Dean's office one month before advance registration. Students contact affiliating institutions. Does not fulfill the requirement for a basic clerkship in psychiatry. Entry Code required.

Radiation Oncology

NN106 University of Washington Medical Center

Radiation oncology is the branch of clinical medicine that utilizes high-energy radiation to treat disease, usually cancer. The department consists of three divisions: clinical oncology, medical radiation physics, and experimental cancer biology. Training programs are offered in all three divisions. Research programs in the Department of Radiation Oncology are aimed at the physical and biological mechanisms of interactions between ionizing radiations and normal and malignant tissues.

Faculty

Chair

Thomas W. Griffin

Professors

Graham, Michael M. * 1980; PhD, 1973, University of California (Berkeley); MD, 1976, University of California (San Francisco); positron emission tomography, nuclear medicine.

Griffin, Thomas W. 1976; MD, 1970, University of Nebraska; therapeutic radiology.

Groudine, Mark * 1982; MD, 1975, PhD, 1976, University of Pennsylvania; chromatin structure and gene activity in development and transformation.

Krohn, Kenneth A. * 1981; PhD, 1971, University of California (Davis); chemistry, radiation oncology.

Laramore, George E. 1976; MS, 1966, PhD, 1969, University of Illinois; MD, 1976, University of Miami (Florida); therapeutic radiology.

Rasey, Janet S. 1979; MS, 1965, Oregon State University; PhD, 1970, University of Oregon; radiation biology.

Wootton, Peter. 1959, (Emeritus); BSc (Hon.), 1944, University of Birmingham (UK); medical radiation physics.

Associate Professors

Austin-Seymour, Mary M. 1988; MD, 1978, University of Chicago; therapeutic radiology.

Kalet, Ira J. * 1980; PhD, 1968, Princeton University; computer simulation of radiation therapy, artificial intelligence, computer graphics.

Koh, Wui-Jin 1984; MD, 1984, Loma Linda University; therapeutic radiology.

Phillips, Mark H. 1991; PhD, 1982, University of Wisconsin; medical radiation physics.

Russell, Kenneth J. 1985; MD, 1979, Harvard University; therapeutic radiology.

Schwartz, Jeffrey L. 1995; PhD, 1979, University of Texas (Dallas); radiation biology.

Wilbur, D. Scott 1986; PhD, 1978, University of California (Irvine); radiochemistry.

Assistant Professors

Cho, Paul S. 1990; PhD, 1989, University of California (Los Angeles); medical radiation physics.

Lindsley, Karen L. 1993; MD, 1985, Vanderbilt University; therapeutic radiology.

Stelzer, Keith J. 1990; PhD, 1985, University of Kansas; MD, 1989, University of California (Los Angeles); therapeutic radiology.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Course numbers with a P suffix are not graduate courses and are restricted to medical student enrollment only.

R ONC 499 Undergraduate Research (*, max. 24) *Austin-Seymour, Cho, Kalet, Koh, Laramore, Lindsley, Phillips, Russell, Stelzer* Opportunities in clinical or laboratory investigation in radiation oncology, radiation physics, or computer-related research. Student participation in ongoing or new projects. Open to students in the biological or physical sciences. Credit/no credit only. Prerequisite: permission of instructor.

R ONC 695P Clinical Cancer Management (*, max. 9) *Stelzer* Participation in the clinical management of patients with cancer, emphasizing a multi-modality approach. Includes clinical assessment, planning of radiation treatment, and follow-up evaluation of patients. Special procedures include implant brachytherapy and intraoperative radiation. Daily teaching conferences with faculty and residents. Prerequisite: MED 665P or permission of instructor.

R ONC 697P Radiation Oncology Special Elective (*, max. 24) *Stelzer* By specific arrangement for qualified students, special clerkship, externship or research opportunities can be made at institutions other than the University of Washington. Students should obtain a "Special Assignment" form from the Dean's Office at least one month before advance registration. Prerequisite: permission of instructor.

Radiology

RR215 University of Washington Medical Center

Diagnostic radiology is that branch of clinical medicine that specializes in the interpretation of various imaging modalities to detect, to characterize, and (with increasing frequency) to treat a wide variety of diseases. Historically, X-rays were the first energy source utilized for these purposes, and they continue to be a mainstay of this discipline. More recently, the armamentarium has grown to include ultrasound, computed tomography, magnetic resonance, and positron emission tomography. In nuclear medicine, one of radiology's major subspecialties, radionuclides are employed for both diagnostic and therapeutic purposes. Another subspecialty is interventional radiology, wherein aspirations and biopsies, as well as therapeutic procedures such as abscess drainage, tumor embolization, and vascular shunts are performed percutaneously. The Department of Radiology consists of two clinical divisions, diagnostic radiology and nuclear medicine. Both divisions are ably supported by technologists and faculty members in the field of radiation physics. Instruction in radiology is provided for medical students, residents, and fellows as well as for other physicians. The faculty and its teaching and research activities are represented in each of the hospitals affiliated with the University.

Faculty

Chair

Albert A. Moss

Professors

Bassingthwaite, James * 1975, (Adjunct); MD, 1955, University of Toronto (Canada); PhD, 1964, Mayo Medical School; computer analysis of transport mechanisms in blood and tissues.

Bush, William H. 1979; MD, 1967, Oregon Health Sciences University; uro-radiology.

Chesnut, Charles * 1974; MD, 1966, University of Florida; nuclear medicine.

Eftmann, Eric L. 1991; MD, 1967, Indiana University; pediatric radiology.

Figley, Melvin M. 1958, (Emeritus); MD, 1944, Harvard University; thoracic and pulmonary radiology.

Freeny, Patrick C. 1991; MD, 1968, University of Oklahoma; abdominal radiology.

Godwin, J. David 1986; MD, 1971, Stanford University; pulmonary radiology.

Graham, C. Benjamin 1956; MD, 1958, University of Washington; pediatric, neonatal radiology.

Graham, Michael M. * 1980; PhD, 1973, University of California (Berkeley); MD, 1976, University of California (San Francisco); positron emission tomography, nuclear medicine.

Harley, John D. 1972; MD, 1966, Washington University; general radiology and angiography.

Kim, Yongmin * 1982, (Adjunct); PhD, 1982, University of Wisconsin; computer architecture, imaging systems, computer graphics, multimedia, modeling and instrumentation.

Krohn, Kenneth A. * 1981; PhD, 1971, University of California (Davis); chemistry, radiation oncology.

Kushmerick, Martin J. * 1988; MD, 1963, PhD, 1966, University of Pennsylvania; muscle contraction, magnetic resonance, metabolic imaging NMR spectroscopy.

Lewellen, Thomas * 1975; PhD, 1972, University of Washington; bioengineering, electrical engineering.

Maravilla, Kenneth R. 1987; MD, 1970, State University of New York (Brooklyn); neuroradiology and neurosurgery.

Moss, Albert A. 1984; MD, 1967, State University of New York (Upstate); gastrointestinal radiology, computed tomography.

Nelp, Wil B. 1962, (Emeritus); MD, 1955, Johns Hopkins University; nuclear medicine.

Nelson, James A. * 1986; MD, 1965, Harvard University; diagnostic radiology with basic research in related sciences.

Robertson, William D. 1990; MD, 1969, University of British Columbia (Canada); neuroradiology.

Rohrmann, Charles A. 1975; MD, 1966, University of Washington; gastrointestinal radiology.

Talner, Lee B. 1993; MD, 1963, Yale University; urology.

Associate Professors

Brewer, David K. 1978; MD, 1972, Harvard University; pediatric radiology, angiography, computed tomography.

Cohen, Wendy A. 1987; MD, 1975, Harvard University; neuroradiology.

Conley, Kevin E. 1988; PhD, 1983, University of Wisconsin; muscle physiology.

Dalley, Robert W. 1987; MD, 1982, University of Utah; neuroradiology.

Eary, Janet F. 1986; MD, 1980, Michigan State University; nuclear medicine.

Eskridge, Joseph M. 1987; MD, 1981, University of Louisville; neuroradiology.

Gillespie, Thurman 1990; MD, 1980, Thomas Jefferson University; musculoskeletal radiology, orthopaedics.

Griep, Robert J. 1987; MD, 1958, University of Texas (Galveston); internal medicine/radiology.

Hayes, Cecil E. 1991; PhD, 1973, Harvard University; physics, MRI.

Haynor, David R. 1984; PhD, 1971, University of California (Berkeley); MD, 1979, Harvard University; neuroradiology, neurosurgery.

Jacobson, Arnold F. 1987; MD, 1980, University of Illinois; PhD, 1980, University of Wisconsin; nuclear medicine.

Kimmy, Michael 1982, (Adjunct); MD, 1979, Washington University; gastroenterology/endoscopy.

Mann, Frederick A. 1993; MD, 1975, Indiana University; emergency radiology.

Marglin, Stephen I. 1980; MD, 1968, Yale University; chest and oncologic radiology.

Ott, Ralph, Susan M. 1980, (Adjunct); MD, 1974, University of Washington; nephrology.

Phillips, Leon A. 1959, (Emeritus); MD, 1952, Yale University; general radiology, urology.

Richards, Todd L. * 1985; PhD, 1984, University of California (Berkeley); nuclear magnetic resonance imaging, spectroscopy of the brain in demyelinating diseases.

Richardson, Michael L. 1984; MD, 1975, Baylor University; bone and joint radiology and musculoskeletal.

Rosenbaum, David M. 1983; MD, 1977, Albert Einstein College of Medicine; pediatrics.

Rowberg, Alan H. * 1982; MD, 1970, University of Washington.

Schmiedt, Udo P. 1989; PhD, 1979, MD, 1982, University of Heidelberg (Germany); abdominal imaging.

Schulte, Scott J. 1988; MD, 1979, University of Washington; gastrointestinal radiology.

Stewart, Brent K. * 1993; PhD, 1988, University of California (Los Angeles); physics.

Takasugi, Julie E. 1988; MD, 1982, University of California (Los Angeles); pulmonary radiology.

Tewson, Timothy J. 1994; PhD, 1972, University of London (UK); synthesis of PET radiopharmaceuticals and their behavior in vivo.

Weinberger, Edward 1985; MD, 1979, Harvard University; pediatric radiology.

Wilson, Anthony J. 1994; MBChB, 1972, Otago University (New Zealand); orthopaedic trauma imaging, teleradiology, digital radiography, MRI/CT.

Assistant Professors

Althaus, Sandra J. 1991; MD, 1984, University of Wisconsin; angiography, interventional radiology.

Escobedo, Eva M. 1992; MD, 1985, Stanford University; musculoskeletal radiology.

Glickerman, David J. 1990; MD, 1983, Albany Medical College; angiography, interventional radiology.

Harrison, Scott D. 1992; MD, 1987, University of Washington; abdominal imaging.

Hunter, John C. 1992; MD, 1970, University of Illinois; musculoskeletal.

Jarvik, Jeffrey G. 1993; MD, 1987, University of California (San Diego); neuroradiology.

Lewis, David H. 1990; MD, 1985, Virginia Commonwealth University; nuclear medicine.

Nghiem, Hanh Vu 1992; MD, 1987, Wayne State University; abdominal imaging.

Shaw, Dennis 1985; MD, 1983, University of Washington; neuroradiology, pediatric radiology.

Stern, Eric J. 1992; MD, 1985, University of Medicine & Dentistry of New Jersey; chest radiology.

Winter, Thomas C. 1990; MD, 1986, Duke University; ultrasound, computed tomography, MRI.

Winters, William D. 1989; MD, 1983, University of Utah; pediatric radiology.

Yuan, Chun 1991; PhD, 1988, University of Utah; medical biophysics, MRI.

Instructor

Tsai, David W. 1995, (Acting); MD, 1989, University of Missouri; trauma.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Course numbers with a P suffix are not graduate courses and are restricted to medical student enrollment only.

RADGY 498 Undergraduate Thesis (*) Nelson Supervised clinical and/or laboratory research in the broad field of medical imaging, culminating in a thesis. The thesis will be submitted to Dr. James Nelson for suitable recognition. Offered: AWSpS.

RADGY 499 Undergraduate Research (*) Nelson Opportunity to gain research experience and direct participation in either clinical or basic sciences investigation in diagnostic radiology and/or nuclear medicine. Written exposition of the results of this experience will be submitted to Dr. James Nelson. Offered: AWSpS.

RADGY 508 Physical Aspects of Medical Imaging (4) Stewart Quantitative physical principles of medical imaging are presented for electromagnetic and sonic radiation. Methods of image formation and analysis are discussed for conventional film radiography, CT, DSA, PET, B-mode ultrasound and Doppler ultrasound. Offered: jointly with BIOEN 508.

RADGY 550 Nuclear Magnetic Resonance in Biomedicine (2) Hayes, Kushmerick, Richards, Yuan Basic physics of nuclear magnetic resonance (NMR) imaging and spectroscopy are presented. Research applications of NMR in physiology and biochemistry are reviewed with emphasis on the brain. Grade based on written tests and small research paper. Prerequisite: permission of instructor. Offered: jointly with BIOEN 565; odd years; Sp.

RADGY 580P Nuclear Medicine Technique, Physics, and Instrumentation (2.5) Lewellen Provides familiarization with basic nuclear phenomena and with the instrumentation used in the practice of nuclear medicine. There are discussions and laboratory exercises. Practical experience in instrument operation and sample counting are provided. Prerequisite: permission of instructor. Offered: S.

RADGY 600 Independent Study or Research (*) Nelson Prerequisite: permission of Dr. Nelson and faculty sponsor. Offered: AWSpS.

RADGY 693P Introduction to Diagnostic Radiology (4) Schulte Half-time clerkship in the field of medical imaging. Lectures, case discussions, film reading, and independent study provide an overview of the subspecialty areas of diagnostic radiology and nuclear medicine. Emphasis on utilization and selection of imaging tests, radiologic anatomy, and interpretation of commonly encountered studies. Offered: AWSpS.

RADGY 694P Advanced Clinical Clerkship (8) Schulte Full-time clerkship provides a more in depth experience in diagnostic radiology and nuclear medicine. Required rotations in the subspecialty areas of radiology augment the basic lecture series and case discussions of Radiology 693. For those with a special interest in diagnostic radiology. Prerequisites: permission of instructor. Offered: AWSpS.

RADGY 696P Nuclear Medicine Clerkship (*, max. 12) Nelp Daily participation at University of Washington Medical Center nuclear medicine clinic emphasizing technical performance, diagnostic interpretation, and clinical relevance of nuclear imaging. Daily clinical teaching conferences of the division. Four- and six-week clerkships can be preplanned in areas such as pulmonary, cardiovascular, renal, bone, computer analysis. Prerequisite: permission of instructor. Offered: AWSpS.

RADGY 697P Radiology Special Electives (*, max. 24) Schulte Radiologic training in a nonaffiliated institution. Permission and arrangements must be made at the time of registration through direct communication between the student and the education coordinator in Radiology. A written outline from a preceptor at the intended site required. Prerequisite: permission of radiology education coordinator. Offered: AWSpS.

Rehabilitation Medicine

BB919 Health Sciences

The Department of Rehabilitation Medicine provides instruction for medical students, interns, and residents in a comprehensive approach to rehabilitation problems. This includes special diagnostic and evaluative procedures; methods and rationale in the application of principles of occupational therapy, physical therapy, prosthetics and orthotics, and other health professions; and advanced investigation of special problems encountered in the field. In addition, the department conducts a residency training program for the specialty of physical medicine and rehabilitation.

The department offers curricula leading to the following degrees: Bachelor of Science in Occupational Therapy, Master of Science (occupational therapy);

Bachelor of Science in Physical Therapy, Master of Physical Therapy, Master of Science (physical therapy); Bachelor of Science in the field of prosthetics and orthotics, as well as a Master of Science (rehabilitation medicine) or Master of Rehabilitation Medicine degree for residents in physical medicine and rehabilitation who wish to enter the academic field.

Occupational Therapy

Head

Elizabeth M. Kanny

Occupational therapy is a health profession that provides services related to functional performance in everyday life, whether it be in activities of daily living, work, or play/leisure activities. Occupational therapists work with people who have physical illness or injury, social or emotional difficulties, congenital or developmental problems, or who are in need of preventative strategies that promote well-being. They serve people in all age groups, and of diverse cultural and ethnic groups and socio-economic levels.

Occupational therapy interventions focus on increasing independent function, enhancing development, and minimizing or preventing disability. Interventions include adaptation of activities or the environment to achieve maximum independence and to enhance quality of life. Services may include: training in self-care activities; design, fabrication, and application of splints; sensorimotor activities; therapeutic group activities; selection and use of adaptive equipment; adaptation of physical environments in the home, school, work, or community; therapeutic activities to enhance functional performance in everyday life; and work evaluation, work hardening, and workplace adaptations; and leisure exploration and performance.

Today's occupational therapists work in clinical practice, administration, education, research, private practice, and home health. Work settings include: rehabilitation centers and hospitals; public and private schools; home health agencies; mental health centers and psychiatric hospital settings; substance abuse centers; vocational rehabilitation centers and industrial clinics; wellness and prevention programs; and hospices.

The program is designed to build on a preprofessional liberal arts foundation. Then in the professional program, theoretical and technical knowledge in occupational therapy is linked with professional values, attitudes, and skills. The education of each student is based on the philosophy that "occupational performance" (including activities of daily living, work, leisure/play) is central to and provides a purpose and meaning to one's life. Professional standards of practice, ethics, and continued professional growth are emphasized throughout the program. The program is accredited by the Accreditation Council for Occupational Therapy Education of the American Occupational Therapy Association. It includes two years of professional course work and six months of clinical fieldwork training. Completion of all University and program requirements leads to the Bachelor of Science in Occupational Therapy degree awarded by the School of Medicine, Department of Rehabilitation Medicine. Graduates of the program are eligible to sit for the national certification examination for the occupational therapist administered by the American Occupational Therapy Certification Board (AOTCB). After successful completion of this exam, the individual will be an Occupational Therapist, Registered (OTR). Most states, including Washington, require state licensure in order to practice; however, state licenses are usually based on the results of the AOTCB Certification Examination.

Admission Requirements: Students are admitted to the baccalaureate program at the junior level; however, some applicants have completed three or more years of college work or may hold a baccalaureate degree

before applying to the program. The admission process occurs once a year for entry autumn quarter of each year; the application deadline is February 15.

Preprofessional requirements for entrance include completion of the College of Arts and Sciences language, writing, reasoning, and general education requirements, as follows: 5 credits English composition; minimum 10 credits additional writing-intensive courses (identified as W courses in the quarterly *Time Schedule*); through the third quarter of a single foreign language; 5 credits quantitative and symbolic reasoning. Minimum grade for the English composition course and the third-quarter course in foreign language must be 2.0. The general education requirements include 20 credits minimum in each of the following three Areas of Knowledge: Visual, Literary, & Performing Arts; Individuals & Societies; the Natural World.

Specific prerequisite courses include the following:

Physical Sciences: CHEM 120, Introduction to General Chemistry (5 credits), or CHEM 140, General Chemistry (4); PHYS 114, General Physics (4); PHYS 117, General Physics Laboratory (1).

Biological Sciences: B STR 301, General Anatomy (4); ZOOL 118, Survey of Physiology (5).

Social Sciences: PSYCH 101, Psychology as a Social Science (5 credits); PSYCH 305, Deviant Personality (5); PSYCH 306, Developmental Psychology (5); SOC 110, Survey of Sociology (5).

Prerequisite courses simultaneously fulfill the following Areas-of-Knowledge requirements: all 20 credits of Individuals & Societies; and most credits of the Natural World.

To apply, students must have completed five of the prerequisite courses, with two courses in the physical and biological sciences. They must have earned a minimum GPA of 3.00 in the prerequisite courses with no single course graded less than 2.0; and have a cumulative GPA of 2.70 in order to be eligible to apply. Admission is competitive, based on demonstrated academic ability, communication skills, and understanding and experience in occupational therapy. Detailed program requirements and selection process information may be obtained from the curriculum office.

Graduation Requirements: The following courses must be completed satisfactorily in the scheduled sequence, beginning autumn quarter only, at the UW: REHAB 320, 321, 322, 332, 380, 414, 417, 435, 442, 444, 445, 446, 447, 448, 468, 470, 473, 481, 482, 483, 484, 485, 486, 487, 488, 489, 494, B STR 431, and HUBIO 563.

Student Evaluation: The University grade-point system is used in student evaluation. A student must maintain a cumulative GPA of 2.50 in all required professional course work to maintain satisfactory standing and to graduate. The student must attain a minimum grade of 2.0 in all required courses, with the exception of one course grade allowed between 1.7 and 1.9, or be required to repeat that course at the next offering.

At the end of any academic quarter in which a student's performance falls below the scholastic requirement, he/she is placed on academic probation and is allowed two additional consecutive quarters to raise the GPA to 2.50. A student who fails to meet the above scholastic requirements is dismissed from the program and advised to transfer to an alternative major or withdraw from the University.

The student must satisfactorily complete all academic course work before being promoted to Level II Fieldwork (REHAB 494). Two Level II Fieldwork placements are required. If a student should fail to pass a Level II Fieldwork placement he/she must petition the Occupational Therapy Advisory and Evaluation Committee for approval to repeat it. A Level II Fieldwork placement can be repeated only once.

Physical Therapy

Head

JoAnn McMillan

Physical therapy is a direct form of professional patient care that can be applied in most disciplines of medicine. The principal objective in physical therapy is to restore or improve motor function in individuals with musculoskeletal and/or neuromuscular problems.

Management of problems related to motor function is only part of the work of physical therapy. Equally important is a rebuilding of self-confidence and the creation of a desire to return to a normal active life. Other primary objectives of physical therapy are prevention of disability and pain, and training in mobility skills for those who must adapt to permanent disability.

As a consequence of the scope of the profession, physical therapists function in a variety of settings, the most familiar being the hospital. Physical therapists also plan, provide, and supervise evaluation and direct patient care in outpatient clinics, rehabilitation centers, developmental centers, home-health agencies, schools, extended-care facilities, voluntary health programs, industry, and private practices. The physical therapist may be found anywhere that quality health care is needed. Increasingly, physical therapists are becoming involved in basic and clinical research; in the academic community, either as full-time faculty members or as supervisors of clinical education; and as consultants in local, state, and federal health-planning activities.

Physical therapists function in compliance with the licensing laws and ethical principles that govern the practice of physical therapy. The steps to licensure as a physical therapist vary slightly from state to state, but all physical therapists graduate from an accredited curriculum of physical therapy that includes a specific period of clinical training. As physical therapy relates to the majority of medical specialties, the education program is broad in scope, including an emphasis on physical and social sciences. The physical therapist evaluates the patient's problem by testing such factors as range of joint motion, muscle strength, posture and gait, pulmonary function, sensation and sensory perception, orthotic and prosthetic fit, reflexes and muscle tone, and functional skills. Some of the procedures used may include ultrasound, superficial heat and cold, electrical stimulation, massage, traction, joint mobilization, biofeedback, therapeutic exercise, and training in the use of orthotic, prosthetic, and other assistive devices, such as crutches, canes, and wheelchairs.

As with all professionals in health fields, physical therapists are responsible for subscribing to a program of continuing education. Some therapists also develop the knowledge and skills of a specialist via continuing education and concentrated practice in one area, such as sports or pediatric therapy. A formalized mechanism for certifying specialists is implemented by the national professional association, the American Physical Therapy Association.

The University baccalaureate program in physical therapy is accredited by the American Physical Therapy Association Commission on Accreditation in Physical Therapy Education.

Admission Requirements: The following information is an overview. Applicants are urged to request more detailed program information (which is updated annually and available after October 1 each year) from the Physical Therapy Curriculum Office, Box 356490, University of Washington, Seattle, Washington 98195-6490, (206/685-7408). Students are urged to request these materials early, since the deadline for receipt of applications is February 15. At the time of entrance to the program (autumn quarter), applicants must be legal residents of Washington, Idaho, Alaska, Mon-

tana, Oregon, Hawaii, Wyoming, or Nevada. Preference is given to Washington residents.

University general education, writing, and reasoning requirements must be completed prior to admission. General education courses must include at least 40 credits, with 10 credits minimum in each of the following three Areas of Knowledge: Visual, Literary, & Performing Arts; Individuals & Societies; the Natural World. Writing courses (minimum 12 credits) consist of 5 credits of English composition plus two additional writing-intensive courses. Reasoning courses must total no less than 5 credits devoted to reasoning skills. Students may satisfy these requirements (and the specific physical therapy prerequisite courses which follow) with courses completed for previous college-level degrees.

Applicants to the program must also complete specific physical therapy prerequisite courses as follows. These courses, as they apply, may also satisfy University general education requirements.

Chemistry: CHEM 140, 150, General Chemistry (4, 4 credits) or CHEM 120, Introduction to General Chemistry (5) and CHEM 220, Introduction to Organic and Biochemistry (5), or equivalents.

Physics: PHYS 114, 115, 117, 118, General Physics and Laboratory (4,4,1,1).

Anatomy and Physiology: B STR 301, General Anatomy (4 credits) and ZOOL 118, Survey of Physiology (5), or equivalents.

Microbiology: MICROM 301, General Microbiology (3) and MICROM 302, General Microbiology Laboratory (2), or equivalents.

Psychology: PSYCH 101, Psychology as a Social Science (5) or PSYCH 102, Psychology as a Natural Science (5) plus an additional psychology or psychiatry course.

The preceding courses in chemistry, physics, anatomy and physiology, and microbiology may all be used toward general education requirements in the Area of Knowledge entitled "the Natural World." Courses taken to satisfy the psychology prerequisite requirement may be applied toward the Area of Knowledge entitled "Individuals & Societies" if they have a social science orientation, e.g., PSYCH 101, or toward "the Natural World" if they have a natural science orientation, e.g., PSYCH 102.

By the application deadline (the end of the preceding autumn quarter or semester), students must have completed at least 28 required physical therapy prerequisite credits. Courses in progress on February 15, the application deadline, are not counted toward this minimum. Students must also have earned a minimum 3.00 GPA, with no individual course grade below a 2.0 in the prerequisite courses completed. All applicants must have earned a minimum 2.70 cumulative GPA for all college-level work.

All specific physical therapy prerequisite credits must be completed prior to entrance into the program, with minimum GPAs, and minimum individual grades mentioned above, met or exceeded. Admission is competitive, based on demonstrated academic ability and apparent aptitude for physical therapy. Returning students who previously dropped out of the program must reapply and are subject to the same review process as that used for all other applicants.

While the professional phase of the entry-level professional program is designed to begin with the junior year of a four-year baccalaureate curriculum, the majority of applicants have completed three or more years of college work before being accepted into the program. Most students admitted hold a baccalaureate degree in another discipline. To be competitive, applicants must arrange for a strong and general program of prerequisite course work that includes the specific courses listed above. Changes in the program requirements at the University may be made in the future to

accommodate professional initiatives. Students are encouraged to contact the Physical Therapy Curriculum Office (206/685-7408) for information updated yearly.

Graduation Requirements: The following courses must be completed satisfactorily in the scheduled sequence, beginning autumn quarter only, at the UW: REHAB 320-321, 322, 332, 404-405, 413, 414, 416, 442, 443, 444-445, 451-452, 463, 486, 471-472, 475, 476, 490, 495; PATH 410; B STR 431.

Student Evaluation: The University grade-point system is used. A student in the professional phase of the curriculum must maintain a cumulative GPA of 2.50 in all required courses for satisfactory standing and for graduation. At the end of any academic quarter in which a student's performance falls below that point, he or she is placed on academic probation. Once on academic probation, a student is allowed two additional consecutive quarters to bring his or her curriculum GPA to 2.50. A student not meeting the above standard is dropped from the curriculum and advised to transfer to an alternate major within the University or to withdraw from the University.

Any grade of less than 2.0 in a professional curriculum course may necessitate repetition of that course if recommended by the physical therapy faculty and approved by the Advisory and Evaluation Committee.

Prosthetics and Orthotics

The prosthetist-orthotist is a member of a professional medical team devoted to the evaluation and treatment of persons with physical disabilities. The prosthetist-orthotist is responsible for the design and fabrication of prosthetic and orthotic devices (artificial limbs and braces) to enable patients with disabilities of all ages to enjoy more functional and independent lives. The prosthetist-orthotist works primarily in private practice clinical settings and private and public hospitals.

Bachelor of Science

The program is accredited by the National Commission on Orthotic and Prosthetic Education. Completion of all University and program requirements leads to a Bachelor of Science with a major in prosthetics and orthotics awarded by the School of Medicine, Department of Rehabilitation Medicine. Graduates of the program are eligible to sit for the national certification examination administered by the American Board for Certification in Prosthetics and Orthotics after completion of an accredited residency program composed of 1900 hours of supervised clinical practice in each discipline.

Admission Requirements: The admission process occurs once a year for entry autumn quarter of each year. The application deadline is February 15. Students are admitted to this curriculum at the junior level. Preprofessional requirements for admission include completion of the University writing and reasoning requirements (5 credits of English composition with a minimum grade of 2.0; two additional writing courses totaling a minimum of 10 credits; 5 credits quantitative and symbolic reasoning) and the College of Arts and Sciences Areas-of-Knowledge requirements (20 credits Visual, Literary, & Performing Arts; 20 credits Individuals & Societies; 20 credits the Natural World). Postbaccalaureate (fifth-year) students are exempt from the writing and reasoning requirements but not from the Areas-of-Knowledge requirements.

Applicants must achieve a minimum 2.00 cumulative GPA on a 4.00 scale. In addition, by the end of autumn quarter or semester of the year prior to expected admission into the program, applicants must complete at least 22 quarter credits with a minimum 2.50 GPA in the following prerequisite courses (or their equivalent for transfer students): BIOL 101-102 (5-5 credits) or MICROM 301, 302 (3, 2); note that CHEM 220 is a prerequisite for microbiology; PHYS 114, 115, 117, 118 (4,4,1,1); B STR 301 (4); ZOOL 118 (5); PSYCH 101 (5);

CHEM 120 (5). Prerequisite courses fulfill the 5 credit quantitative and symbolic reasoning requirement, 5 credits of the Individuals & Societies requirement and all 20 credits of the Natural World requirement.

At the time of application, a student must submit a reasonable plan for completion before the date of expected entry into the program of the balance of the prerequisite courses listed above. If, by the time of expected entry into the program, the student has not completed all prerequisite courses with a minimum GPA of 2.50 as well as a cumulative GPA of 2.00, that student will not be admitted to the program.

Graduation Requirements: The following courses must be taken in the scheduled sequence, beginning autumn quarter only, at the UW: REHAB 320, 321, 332, 340, 341, 342, 343, 414, 420, 421, 423, 427, 428, 429, 430, 442, 443, 444-445, 451, 452.

Student Evaluation: The University grade-point system is used in student evaluation. A student must maintain a GPA of 2.50 in all required professional course work to maintain satisfactory standing and to graduate. The student must attain a minimum grade of 2.0 in all required courses and will be required to repeat any course work at the next offering with the exception of one course grade allowed between 1.7 and 1.9.

At the end of any academic quarter in which a student's performance falls below the scholastic requirement, he/she is placed on academic probation and is allowed two additional consecutive quarters to raise the professional phase GPA to 2.50. A student who fails to meet this scholastic requirement is dismissed from the program and advised to transfer to an alternative major or withdraw from the University.

Graduate Program

The graduate programs in the Department of Rehabilitation Medicine lead to the following degrees: Master of Science (three pathways: occupational therapy, physical therapy, and rehabilitation medicine), Master of Physical Therapy, and Master of Rehabilitation Medicine.

Master of Science (Occupational Therapy Pathway)

This degree program is designed to prepare occupational therapists to understand and apply occupational therapy theories and frames of reference to clinical practice; to design and conduct research; to provide instruction; and to administer occupational therapy services and/or provide a higher level of clinical service. Independent study options and electives offer flexibility, allowing the student to meet individual objectives. Completion of a data-based thesis is required. Full-time students generally complete the course work in four quarters. The additional time to complete the thesis requirement varies.

Admission Requirements: An applicant for admission must be a graduate of an approved occupational therapy program and must be certified to practice by the American Occupational Therapy Certification Board. A minimum of one year of professional experience is desirable. Detailed information on the program and admission requirements is available from the Division of Occupational Therapy Curriculum Office, (206/685-7411).

Graduation Requirements: All students must meet the minimum requirements for a master's degree as outlined in the Graduate Study section of this catalog. In addition, students must satisfactorily complete (1) core courses required by the occupational therapy program and the specialty track selected by the student, and (2) a data-based thesis contributing the knowledge base in occupational therapy.

Master of Science (Physical Therapy Pathway)

This degree program is designed to prepare physical therapists to assume a career in teaching and administration within the field. An emphasis of the curriculum is preparation for research and contribution to the professional literature; therefore, a thesis is a requirement of this plan. Opportunities are provided to enhance specialized knowledge and skill in selected content areas of physical therapy practice. Depending upon the student's educational goals and prior accomplishments, the program should require one to two calendar years for completion.

Admission Requirements: Selection for admission to the Master of Science degree program (physical therapy pathway) is based on an assessment of intellectual capacity, basic professional competence, promise for future contributions to the field, and availability of the program (due to funding limitations, the program is not offered every year). Students must have completed a baccalaureate degree and an accredited physical therapy program with a minimum cumulative GPA of 3.00, based on a 4-point scale, in all college work. Detailed information on program and admission requirements is available from the Division of Physical Therapy Curriculum Office (206/685-7408).

Graduation Requirements: All students must satisfactorily complete (1) a minimum of 36 credits, including specified core courses; (2) all Graduate School requirements for a master's degree; and (3) a data-based thesis contributing to the knowledge base in physical therapy.

Master of Physical Therapy

The purpose of this program is to provide opportunities to pursue in-depth study in an area of interest related to a clinical specialty and to strengthen general evaluation and management skills for practice as a health-care practitioner. Preparation in statistics and research design and completion of a major project are requirements of this plan. The focus of this curriculum is on work related to future clinical practice in positions of responsibility and on participation in clinical teaching, research, and administration.

Admission Requirements: See requirements for the Master of Science (Physical Therapy Pathway).

Graduation Requirements: Requirements for this program are the same as for the Master of Science (Physical Therapy Pathway), except that students complete a project rather than a thesis.

Master of Science (Rehabilitation Medicine Pathway)

This degree program is designed to prepare physicians, specifically physiatrists, as academicians in the field of physical medicine and rehabilitation. In addition to core course work in relevant medical sciences, an emphasis is placed on developing skills toward the goal of conducting independent or collaborative research projects.

Admission Requirements: An applicant for admission must be a physician from an approved medical school, and must be concurrently enrolled, or have completed, an approved residency program in physical medicine and rehabilitation.

Graduation Requirements: All students must complete (1) a minimum of 36 credits, including specific core courses, (2) all Graduate School requirements for a master's degree, and (3) a data-based thesis contributing to the knowledge base in physical medicine and rehabilitation.

Master of Rehabilitation Medicine

This degree program is designed to prepare physicians to evaluate literature critically, assessing applicability, practicality, and validity. Courses in relevant

medical sciences provide the foundation for in-depth study of the rehabilitation literature. A project must be completed and can be a literature review, preparation of a case study, including pertinent literature review; or a limited research project, emphasizing the review of pertinent research literature.

Admission Requirements: See requirements for the Master of Science (Rehabilitation Medicine Pathway).

Graduation Requirements: Requirements for this program are the same as for the Master of Science (Rehabilitation Medicine Pathway), except that students complete a project rather than a thesis.

Faculty

Chair

Walter C. Stolov

Professors

Anderson, Marjorie E. * 1971; PhD, 1969, University of Washington; physiology of basal ganglia and cerebellum.

Cardenas, Diana D. * 1981; MD, 1973, University of Texas (Dallas); physiologic mechanisms following spinal cord injury, rehabilitation in renal disease.

Dikmen, Sureyya S. * 1974; PhD, 1973, University of Washington; clinical neuropsychology, neuropsychological and psychosocial outcomes in traumatic head injury.

Fordyce, Wilbert E. * 1956, (Emeritus); PhD, 1953, University of Washington; psychology.

Fraser, Robert T. * 1976; PhD, 1976, University of Wisconsin; psychology.

Halar, Eugen M. * 1968; MD, 1959, University of Zagreb (Yugoslavia); psychiatry.

Jaffa, Kenneth M. * 1981; MD, 1975, Harvard University; pediatric rehabilitation, brain injury, neuromuscular diseases, congenital defects, electromyography.

Kraft, George Howard * 1969; MD, 1963, Ohio State University; psychiatry.

Lehmann, Justus F. * 1957, (Emeritus); DrMed, 1945, Johann Wolfgang Goethe University (Germany); psychiatry.

Stolov, Walter C. * 1960; MD, 1956, University of Minnesota; physical medicine and rehabilitation and electrodiagnostic medicine.

Turner, Judith A. 1980; MA, 1975, PhD, 1979, University of California (Los Angeles); psychology.

Yorkston, Kathryn * 1975; PhD, 1975, University of Oregon; neurogenic communication disorders in adults.

Associate Professors

Berni, Rosemarian * 1962, (Emeritus); MN, 1973, University of Washington; rehabilitation nursing.

Czerniecki, Joseph M. * 1982; MD, 1981, University of British Columbia (Canada); MS, 1985, University of Washington; amputation rehabilitation, biomechanics and gait analysis.

Deitz, Jean L. * 1979; PhD, 1976, University of Florida; occupational therapy.

Egan, Kelly J. 1980, (Adjunct); MA, 1968, Texas Technological University; PhD, 1980, University of Washington; clinical psychology.

Gardner, Gregory C. 1989, (Adjunct); MD, 1984, Baylor University; rheumatology.

Hammond, Margaret C. * 1979; MD, 1979, Medical College of Wisconsin; medical consequences of longstanding spinal cord injury.

Hays, Ross M. * 1983; MD, 1978, University of Washington; pediatric rehabilitation, brain injury, neuromuscular diseases, congenital defects, electromyography.

Hillel, Allen D. * 1983, (Adjunct); MD, 1976, Stanford University; peripheral nerve physiology after injury, swallowing disorders in neuromuscular disease.

Jensen, Mark * 1987; PhD, 1989, Arizona State University; assessment and treatment of chronic pain, coping with medical illness, treatment outcome.

Little, James Wendell * 1984; PhD, 1976, MD, 1977, University of Chicago; psychiatry, rehabilitation medicine, clinical neurophysiology.

McMillan, Jo Ann * 1958; MEd, 1968, University of Southern California; physical therapy.

Patterson, David R. * 1984; PhD, 1982, Florida State University; treatment of acute pain, psychology of burn patients, psychological outcome of physical trauma.

Robinson, Lawrence R. * 1989; MD, 1982, Baylor University; psychiatry.

Stimp, Jefferson C. * 1979; PhD, 1976, University of Wisconsin; neurophysiology, cerebral cortex, spinal cord, clinical somatosensory evoked potentials.

Strand, Edythe A. * 1990, (Adjunct); PhD, 1987, University of Wisconsin; neurogenic speech/language disorders.

Assistant Professors

Bell, Kathleen * 1981; MD, 1981, Temple University; brain injury - prognosis, pharmacologic intervention, imaging, medical education.

Bombardier, Charles H. * 1989; PhD, 1987, Washington State University; spinal cord injury adjustment, decubitus ulcers, brain injury, alcohol abuse after injury.

Chang, Michael Wei * 1992; MD, 1988, University of Texas (Galveston); physical medicine and rehabilitation, electrophysiology biomechanics.

Engel Knowles, Joyce M. * 1993; PhD, 1988, University of Kansas; use of occupational therapy in pain management, especially with children.

Esselman, Peter C. * 1986; MD, 1986, University of Washington; exercise in the elderly; treatment of traumatic brain injury and burn rehabilitation.

Gitter, Andrew J. * 1984; MD, 1984, University of Michigan; biomechanics of abnormal gait, quantitative neurophysiologic assessment of neuromuscular disorders.

Goldstein, Barry * 1987; PhD, 1981, MD, 1986, University of California (Los Angeles); skin adaption to mechanical stress, pressure ulcers, overuse injuries of the upper extremity.

Guthrie, Mark R. * 1983; PhD, 1990, University of Washington; functional assessment, physical therapy efficacy.

Haselkorn, Jodie K. * 1985; MD, 1985, Louisiana State University; health services for the disabled; diagnostic accuracy of tests, effectiveness of interventions.

Johnson, Kurt Lewis 1990; PhD, 1984, University of Wisconsin; counseling psychology; psychological, social vocational aspects of disability and chronic illness.

Margherita, Anthony J. 1989; MD, 1985, Georgetown University; psychiatry, spine, sports, and musculoskeletal medicine.

Massagli, Teresa L. * 1985; MD, 1982, Yale University; medical and rehabilitation outcome after spinal cord injury in children.

Odderson, Ib R. * 1985; PhD, 1978, Indiana University; MD, 1985, Vanderbilt University; psychiatry.

Robinson, James P. 1994; PhD, 1969, University of Southern California; MD, 1978, University of California (Los Angeles).

Sanders, Joan Elizabeth * 1993, (Adjunct); PhD, 1991, University of Washington; soft tissue biomechanics and tissue adaptation to mechanical stress.

Stiens, Steve A. 1987; MD, 1986, University of Cincinnati; MS, 1991, University of Washington; spinal cord injury, disability, architecture, spasticity, neurogenic bowel function, wheelchairs.

White, David M. * 1987; PhD, 1987, University of Alabama.

Instructors

Chan, Leighton 1990, (Acting); MD, 1990, University of California (Los Angeles); rehabilitation and public policy.

Peters, David Jesse 1993, (Acting); MS, 1980, PhD, 1982, San Diego State University; MD, 1989, Stanford University; rehabilitation medicine, medical anthropology.

Senior Lecturer

Greenberg, Sharon L. 1979; MOT, 1978, University of Washington; occupational therapy.

Lecturers

Anson, Denis 1988; MS, 1983, University of Washington; occupational therapy, assistive technology, cognition and geriatrics.

Dudgeon, Brian J. 1982; MS, 1983, University of Washington; occupational therapy.

Hertling, Darlene 1964; BS, 1956, University of California (Berkeley); physical therapy.

Kanny, Elizabeth M. 1978; MA, 1977, Seattle University; occupational therapy.

Okumura, Ramona M. 1990; BS, 1981, University of Washington; prosthetics and orthotics.

Yamane, Ann 1979; BS, 1976, University of Washington; prosthetics and orthotics.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Course numbers with a P suffix are not graduate courses and are restricted to medical student enrollment only.

REHAB 320, 321 Medical Science (4,4) Lectures in fields related to: general surgery, obstetrics and gynecology, internal medicine, neurology, rehabilitation medicine, orthopaedics, psychiatry and behavioral sciences, rheumatology, and pediatrics. Required for occupational therapy, prosthetics and orthotics, and physical therapy students. Credit/no credit only.

REHAB 322 Medical Science Laboratory (1, max. 2) Dudgeon, Greenberg, McMillan, Okumura To introduce students to the role of allied health professionals in the treatment of disabilities presented in 320, 321 lectures. Credit/no credit only. Prerequisite: 320, 321.

REHAB 332 Pathologic Physiology for Rehabilitation Professionals (5) Anderson, Slimp Emphasis on normal and pathologic physiology of the circulatory, respiratory, central nervous, and musculoskeletal systems as basis for treatment in occupational therapy, physical therapy, and prosthetics-orthotics. Required for students in these fields. Others by permission. Prerequisites: B STR 301, ZOOL 118, and permission of instructor.

REHAB 340 Spinal Orthotics (3) Yamane Lecture and laboratory instruction in the use of orthotic components and materials, patient evaluation, and fitting of orthoses for management of spinal pathology. Required for prosthetics and orthotics majors; others by permission of instructor. Offered: W.

REHAB 341 Upper-Limb Prosthetics I (4) Okumura Instruction in, and experience with, the use of prosthetic components and materials, including preprosthetic care, prosthetic components, principles of fabrication and harnessing, and techniques of checkout and prosthetic training for all amputation types. Required for prosthetics and orthotics majors; others by permission of instructor.

REHAB 342 Upper-Limb Prosthetics II (4) Okumura Instruction and experience in use of prosthetic components and materials, including preprosthetic care, principles of fabrication and harnessing, and techniques of checkout and prosthetic training, review of anatomy, biomechanics, locomotion, and motor disability as they pertain to upper-limb prosthetics, as well as medical management and prescription considerations. Immediate postsurgical fitting techniques.

REHAB 343 Upper-Limb Orthotics (8) Okumura, Yamane Lecture and laboratory instruction in the use of orthotic components and materials, biomechanics, and clinical assessment. Required for prosthetics and orthotics majors; others by permission of instructor.

REHAB 380 Occupational Therapy in the Health-Care System (3) Kanny Overview of the health services system and the role of occupational therapy. Covers social, economic, political, and demographic factors that influence health care delivery in U.S.; various service delivery providers; reimbursement and policy issues, regulation and credentialing; and health care personnel and roles. Prerequisite: occupational therapy major standing. Offered: W.

REHAB 404, 405 Physical Therapy Management of Musculoskeletal Disorders: I, II (5,5) Hertling Functional anatomy, biomechanics, clinical assessment and management as they relate to patients with common musculoskeletal disorders who have been referred to physical therapy services. Development of appropriate therapeutic strategies for management of extremity joints and spine. Prerequisite: physical therapy major standing.

REHAB 413 Special Studies In Physical Therapy (1-15, max. 24) Theory and practice in specialized areas of physical therapy. Credit/no credit only. Prerequisite: permission of instructor.

REHAB 414 Psychological Aspects of Rehabilitation (2) Patterson Psychological processes underlying adjustment to disability; application of behavioral analysis systems in patient therapy management; effects of cognitive or personality deficits on patient performance and treatment strategies. Credit/no credit only. Prerequisite: occupational therapy, prosthetics and orthotics, or physical therapy major standing. Offered: A.

REHAB 416 Principles of Physical Therapy Administration (3) McMillan The nature of administration, economic trends, operational policy, aspects of supervision, ethical and legal influences applicable to a physical therapy department. Required for physical therapy students. Credit/no credit.

REHAB 417 Introduction to Research in Occupational Therapy (3) Deitz Statistics, tests and measurements, and qualitative and quantitative research methods. Lectures, readings, and assignments related to occupational therapy and rehabilitation medicine research. Prerequisite: occupational therapy major or permission of instructor. Offered: W.

REHAB 420 Lower-Limb Prosthetics I (8) Instruction in fabrication, fitting, and alignment of the patellar-tendon-bearing prosthesis. Emphasis is placed on the biomechanics of below-knee fit and alignment, dynamic alignment, and the use of the below-knee adjustable leg and duplication devices, as well as methods of suspension. Required for prosthetics and orthotics majors; others by permission of instructor.

REHAB 421 Lower-Limb Prosthetics II (11) Instruction in above knee cast modification, socket fabrication, static and dynamic alignment, alignment duplication, and suspension system. Required for prosthetics and orthotics majors; others by permission of instructor.

REHAB 423 Lower-Limb Orthotics (8) Yamane Lecture and laboratory format. Developing clinical competency, the use of orthotic components and materials, patient evaluation, measurements, fabrication and fitting of lower-limb orthoses. Required for prosthetics and orthotics majors; others by permission of instructor. Offered: W.

REHAB 427 Applied Prosthetics and Orthotics I (1, max. 3) Okumura, Yamane Experience in clinical patient management in a rehabilitation medicine setting, attendance at prosthetics and orthotics clinics at University of Washington Medical Center and university-affiliated Seattle hospitals. Required for prosthetics and orthotics majors; others by permission of instructor.

REHAB 428 Applied Prosthetics and Orthotics II (5) Supervised clinical practice under the preceptorship of a certified practitioner for a minimum of 250 hours in each discipline required for prosthetic-orthotic majors. Prerequisite: prosthetic-orthotic major standing.

REHAB 429 Immediate Post-Operative and Early Fitting (3) Okumura Lecture and laboratory designed to introduce the student to the principles of immediate postsurgical prosthetic fitting, including patient management for both upper and lower extremities.

REHAB 430 Advanced Limb Prosthetics and Engineering Concepts (4) Yamane Exposure to principles underlying prosthetic/orthotic devices and practices including hydraulic control, material behavior, force analysis. Offered: S.

REHAB 435 Professional and Therapeutic Communication in Occupational Therapy (2) Engel Provides knowledge and understanding of therapeutic use of self and communication skills with clients, their families and other professionals. Emphasis is placed on communication skills with individuals of diverse ages, educational levels, and cultural and ethnic backgrounds. Prerequisite: occupational therapy major standing. Credit/no credit only.

REHAB 442 Kinesiology (4) Czerniecki, Guthrie Study of joint motion and muscle function in relation to both the normal and abnormal state. Specific techniques employed in the field of rehabilitation medicine are analyzed. Required for Department of Rehabilitation Medicine students; others by permission.

REHAB 443 Introduction to Clinical Evaluation (5) Hertling, Yamane Lecture and laboratory format. Developing clinical competency in goniometric measurement of joint motion, manual muscle strength testing, postural analysis, and gait analysis of normal and pathological patterns. Prerequisite: physical therapy or prosthetics and orthotics majors only.

REHAB 444-445 Function of the Locomotor System (4-4) Guthrie Functions of musculoskeletal system as applied to patterns of motion. Anatomy of peripheral-vascular and peripheral-nervous system. Required for occupational therapy students, prosthetics and orthotics students, and physical therapy students; others by permission of instructor. Prerequisites: B STR 301, ZOOL 118.

REHAB 446, 447 Anatomy Laboratory for Occupational Therapists (1,1) Anson Guided self-study of musculoskeletal, peripheral-vascular, and peripheral-nervous systems from prosected material. Prerequisite: occupational therapy major standing.

REHAB 448 Applied Kinesiology for Occupational Therapists (1) Anson Instruction and laboratory for

cus on practical experience and clinical problem solving related to muscle and joint motion testing procedures, sensory/perceptual testing, prosthetic and orthotic devices, and wheeled mobility devices utilized in occupational therapy treatment. Prerequisite: occupational therapy major standing.

REHAB 451, 452 Functional Anatomy Laboratory (1,1) *Guthrie* Study of musculoskeletal, peripheral-vascular, and peripheral-nervous systems from projected material. Required for physical therapy students and prosthetic/orthotic students.

REHAB 458 Communication Augmentation for Non-Speaking Individuals (3) *NW* Communication needs of nonspeaking individuals. Interdisciplinary approaches to the evaluation, selection, and implementation of aided and unaided communication augmentation systems. Prerequisite: basic coursework in either speech and hearing sciences, physical therapy, occupational therapy, or engineering, or permission of instructor. Offered: jointly with SPHSC 453; Irregularly.

REHAB 463 Application of Physical Therapy Modalities (1-2, max. 3) *McGee* Principles and concepts of basic physical therapy procedures. Laboratory practice of hydrotherapy and superficial heating modalities. Methods of application of diathermy and ultrasound, TENS, EMG-biofeedback, low and high voltage therapies and ultraviolet light. Lectures and laboratories. Credit/no credit only. Prerequisite: physical therapy major standing.

REHAB 466 Advanced Biophysical and Physiological Effects of Modalities (2) *Esselman* Biophysical principles of equipment employed in physical therapy, physiological effects produced. Required for physical therapy students; others by permission of instructor.

REHAB 468 Analysis of Therapeutic Activities (2) *Greenberg* Skills in the analysis, adaptation, and sequencing of therapeutic and functional activities as they apply to occupational performance. Analysis focuses on performance components (sensorimotor, cognitive, psychosocial, psychological), temporal aspects (chronological, developmental), and environmental aspects (physical, social, and cultural). Prerequisite: occupational therapy major standing.

REHAB 470 Vocational Assessment and Training (3) *Dudgeon* Knowledge and skill competencies applicable to evaluation and training of individuals with vocational/work related disabilities. Emphasis placed on worker characteristics and job analysis as well as rules and techniques of accommodation within business and industrial settings. Prerequisite: occupational therapy major standing.

REHAB 471 Therapeutic Exercise Procedures I (5) Theory and principles of basic exercise procedures used for treatment purposes in physical therapy motor learning and control, variables of motor performance, risks and benefits of exercise, exercise prescription, selected patient assessment and exercise procedures. Lectures and laboratories. Simulated patient problems. Prerequisite: physical therapy major standing

REHAB 472 Therapeutic Exercise Procedures I (5) *Kartin, Mullens* Theory and principles of advanced therapeutic exercise procedures: normal motor development, facilitation and inhibition elements adaptation of procedure to appropriate age level and impairment. Lectures and laboratories. Simulated patient problems. Prerequisite: physical therapy major standing

REHAB 473 Administration of Occupational Therapy Services (3) *Kanny* Organizational and administrative techniques including strategic planning, program planning, fiscal management, productivity measures, quality assurance, personnel management, and marketing. Practice in developing skill through program-based learning. Prerequisite: occupational therapy major standing. Offered: Sp

REHAB 475 Physical Restoration (4) Lectures and laboratory practice to develop special skills in physical therapy directed toward facilitation of movement as applied to treatment of severe neurological and musculoskeletal dysfunction. Treatment techniques in mobility, activities of daily living, self-care, transfers, and ambulation activities. Required for physical therapy students.

REHAB 476 Prosthetic and Orthotic Evaluation and Use (2) *Okumura* Instruction in mechanical component substitution for functional losses. Emphasis is on biomechanical principles, prosthetic-orthotic components, and alignment and fitting techniques. Credit/no credit only. Prerequisite: physical therapy major standing. Offered: Sp.

REHAB 481 Introduction to Theory and Practice of Occupational Therapy (4) *Greenberg* History, philosophical base, theoretical foundations, frames of reference, and practice arenas of occupational therapy. Professional attitudes, values, and behavior explored. Clinical experiences enhance didactic coursework through observation in practice settings. Prerequisite: occupational therapy major standing. Offered: A.

REHAB 482 Occupational Performance through the Life Span (4) *Dudgeon* Overview of human development and its relationship to occupational performance (life activities). Emphasis is on life activities and roles at specific ages and stages from infancy to old age. Lecture, lab, and community-based experiences. Prerequisite: major standing in occupational therapy. Offered: W.

REHAB 483 Occupational Therapy Theory and Practice in Physical Disabilities I (5) *Dudgeon* Theoretical bases and clinical skills in occupational therapy assessment and intervention with individuals experiencing sensorimotor and/or cognitive impairments impacting functional life performance of roles and tasks in activities of daily living, work, and/or leisure. Fieldwork enhances didactic coursework through selected participation in practice setting. Prerequisite: occupational therapy major standing. Offered: A.

REHAB 484 Occupational Therapy Theory and Practice in Psychosocial Dysfunction I (4) *Engel* Theoretical bases and clinical practice skills in occupational therapy assessment and intervention with individuals who have psychological and/or cognitive impairments which impact performance of life roles and tasks in self-care, work, and leisure. Prerequisite: occupational therapy major standing. Offered: A.

REHAB 485 Occupational Therapy Theory and Practice in Geriatrics (4) *Dudgeon, Engel* Occupational therapy assessments and interventions with older adults. Covers psychology of aging, physiology of aging, sociodemographics of aging, social interactions skills with elderly, and activity performance. Fieldwork enhances didactic coursework through participation in the practice setting. Prerequisite: occupational therapy major standing. Offered: Sp.

REHAB 486 Occupational Therapy Theory and Practice in Pediatrics (5) Lectures, discussions, and clinically-oriented experiences related to occupational performance (life activities) of children with special needs and their families in diverse pediatric settings. Emphasis on assessing child in temporal and environmental contexts, applying pediatric frames of reference, and collaborating with families and team members. Prerequisite: occupational therapy major standing. Offered: Sp.

REHAB 487 Assistive Technology in Rehabilitation (3) *Anson* Overview of the field of assistive technology as it impacts occupational roles and tasks in self-care, work, and leisure. Covers interface devices, computer applications, environmental controls, augmentative communications, power mobility, and sensory enhancement. Prerequisite: occupational therapy major standing.

REHAB 488 Occupational Therapy Theory and Practice in Physical Disabilities II (4) *Greenberg* Integration of theoretical concepts and practice skills through case simulations and laboratory experiences. Emphasis on strategies and techniques of evaluation and goal setting as well as treatment planning and implementation within various service delivery systems. Prerequisite: occupational therapy major standing. Offered: W.

REHAB 489 Occupational Therapy Theory and Practice in Psychosocial Dysfunction II (5) *Engel* Continuation of 484 with special emphasis on application of psychosocial occupational therapy frames of reference to client evaluation and intervention. Fieldwork enhances didactic coursework through participation in the mental health practice setting. Prerequisite: occupational therapy major standing. Offered: W.

REHAB 490 Clinical Clerkships in Physical Therapy (2, max. 4) Observation, instruction, and supervised practice in treatment of patients in diverse clinical settings. Emphasis is given to the application of previously learned material and skills to specific clinical problems. Required for physical therapy students. Credit/no credit only.

REHAB 492 Pathways in Occupational Therapy (*, max. 3) Provides the opportunity for continued study in specific areas of interest under preceptorship of selected faculty members with guided readings and clinical experiences. Oral presentation of completed projects to students and faculty. Credit/no credit only. Prerequisite: occupational therapy major standing.

REHAB 494 Clinical Fieldwork in Occupational Therapy (4-12) *Kannenberg, Kanny* A minimum of six months (940 hours) of directed and supervised experiences with persons across the lifespan, with various psychosocial and performance deficits, and in various service delivery systems reflective of current practice in the profession. Prerequisites: occupational therapy major standing.

REHAB 495 Clinical Affiliation in Physical Therapy (2-12, max. 24) Clinical practice of physical therapy techniques under supervision in community-based clinics. Credit/no credit only. Prerequisite: physical therapy major standing.

REHAB 496 Special Topics in Rehabilitation (1-9, max. 14) Guided opportunity for in-depth study in specific areas of rehabilitation. Topics vary. Prerequisite: permission of instructor.

REHAB 498 Undergraduate Thesis (*) Prerequisite: permission of instructor.

REHAB 499 Undergraduate Research (*) Opportunity to design, perform, and analyze research investigation in problem areas in rehabilitation medicine. These include clinical and basic research problems in, for example, head and spinal injury, chronic disease, pain neurophysiology, electrodiagnosis, communication, and bioengineering. Prerequisite: permission of instructor.

REHAB 500 Specialized Clinical Experience in Physical Therapy (1-5, max. 15) *Kartin* Student is assigned to an affiliated clinical facility. Activities focus on a variety of processes. These might include acquisition of an advanced and/or specialized treatment skill to be used in patient care; the development and presentation of an in-service training program; the analysis and assessment of existing supervisory problems. Credit/no credit only. Prerequisite: permission of instructor.

REHAB 501 Physical Therapy Management of Selected Motor Problems (2-5, max. 7) *Guthrie* Study of mechanisms involved in the control of movement. Critical examination of selected literature and techniques dealing with the evaluation or modification of motor behavior. Prerequisite: physical therapy graduate student standing.

REHAB 502 Perspectives in Pediatric Physical Therapy (3) *Kartin, Mullens* Overview of pediatric therapeutic practices for atypically developing children. Standardized assessment, development of functional goals and objectives, treatment efficacy, family-centered intervention, and treatment planning for specific disabilities. Assessment project with atypically developing child required. Credit/no credit only. Prerequisite: permission of instructor.

REHAB 505 Foundations of Occupational Therapy (2) *Kanny* In-depth exploration of philosophical base of occupational therapy and ways in which theories and frames of reference influence occupational therapy practice and research. Offered: A.

REHAB 510 Rehabilitation Psychology (2) *Jensen* Processes and management methods for assimilation of disability, enhancing patient participation in rehabilitation process, and for helping in maintenance of performance; behavioral management and case conference strategies; rehearsal of contingency management techniques. Required for residents; others by permission of instructor.

REHAB 513 Special Studies in Physical Therapy (1-5, max. 15) *Kartin* Theory and practice in specialized areas of physical therapy. Includes organization and administration of specialized programs, advanced evaluation and treatment techniques, role of the consultant. Credit/no credit only. Prerequisite: permission of instructor.

REHAB 514 Effective Service Delivery in Educational Settings (2) Development of knowledge, skills, and attitudes necessary for optimizing service delivery in educational settings to children with disabilities. Public laws, service delivery models, best practice issues, ethical decision making, cross-cultural competence, and interagency relationships addressed. For occupational and physical therapists, speech and hearing pathologist, and other related services personnel.

REHAB 515 Assessments and Interventions for Children with Emotional and Behavioral Disorder (2) Presentation of current knowledge regarding emotional and behavioral disorders in children for occupational and physical therapists and other personnel working in educational settings. Areas covered include contributing factors, frames of reference, intervention models, assessment and intervention strategies, individual educational plans, and medications.

REHAB 516 Medical Information for Rehabilitation Counselors (3) *Johnson* Lectures in medical science field regarding the etiology, prognosis, and physical restoration of common disabling conditions. Case studies are used extensively, and major emphasis is placed on vocational implications of physical disability. Prerequisite: permission of instructor.

REHAB 518 Infants and Young Children: Current Research (3) *Deitz, Swanson* Introduces students to recent research relating to assessment and intervention with infants and young children who are "at risk" or who are disabled. Critical evaluation of the current research emphasized. Prerequisites: clinical experience or coursework related to infants and young children with disabilities and permission of instructors.

REHAB 520 Seminar (1-5) Conferences, seminars, discussions of advanced physical medicine and rehabilitation topics for graduate students, residents and postdoctoral fellows in rehabilitation medicine. Lectures, discussion, and laboratory work in selected aspects appropriate to elected area of study for applicants for master-level degree.

REHAB 522 Neurophysiological Topics in Rehabilitation Medicine (2) *Anderson* Review of traditional neurophysiological concepts and an exposition of recent advances in neurophysiological research related to the practice of rehabilitation medicine. Prerequisite: permission of instructor.

REHAB 530 Medical Aspects of Vocational Counseling (2/3) *Johnson* Introduction to vocational implications of physical and emotional disabilities. Methods, counseling techniques, therapeutic modalities, community resources used in producing vocational assistance for persons with disabilities. Prerequisite: resident standing in rehabilitation medicine or permission of instructor.

REHAB 532 Clinical Affiliation for Rehabilitation Counselors (5-6) *Johnson* Under preceptorship of rehabilitation counseling staff, students counsel and evaluate patients with severe physical, emotional, or social problems; administer vocational testing; obtain placement on job stations; work with community resources for vocational/educational placement; and develop activity-oriented schedules. Prerequisite: permission of instructor.

REHAB 539 Communication Disorders in Rehabilitation Medicine (1) *Yorkston* Overview of communication disorders secondary to central and peripheral nervous system impairment. Emphasis on facilitating identification of speech/language disorders with discussion of implications for rehabilitation. Prerequisite: graduate student status (postdoctoral fellow).

REHAB 540 Application of Measurement Systems (3) *Deitz* Introduction to reliability, validity, norms, the test development process, statistics relevant to tests and measurements, and ethical implications of testing. Critical evaluation of selected standardized tests used in occupational and physical therapy. Prerequisite: permission of instructor. Offered: A.

REHAB 544-545 Functional Anatomy for Physiatrists (2-2) *Goldstein* Lectures and demonstrations to illustrate functional anatomy as applied by physicians in the practice of clinical rehabilitation. Intended to enhance functional assessments and to improve neuro-musculo-skeletal diagnosis and treatment through greater understanding of the underlying anatomy. Prerequisite: resident standing in rehabilitation medicine; others by permission of instructor.

REHAB 546 Teaching Practicum in Occupational and Physical Therapy (1-3) Integration of knowledge and skills in teaching through teaching in the classroom or presentation of a minicourse, workshop, or in-service training series. Prerequisites: MEDE 520 and permission of instructor.

REHAB 547 Application of Biomechanics to Clinical Problems (2) Application of biomechanical and kinematic principles to the analysis and management of clinical problems. Applicable to a variety of clinical problems including evaluation of gait and prescription of braces and prostheses. Prerequisites: knowledge of basic kinesiology and biomechanics or permission of instructor.

REHAB 550 Neuropsychology in Rehabilitation (2) *Dikmen* Examination and management of patients with brain lesions, as well as an understanding of the consequences of such conditions. Prerequisite: graduate standing in rehabilitation medicine.

REHAB 555P Neuromuscular Electrodiagnosis (2.5) *Kraft* Demonstration of fundamentals of electromyography and peripheral nerve stimulation followed by participation in clinical electrodiagnosis examinations. Develops awareness of the usefulness of knowing when such procedures are indicated for patients and interpret results rather than develop proficiency in performing these examinations. Prerequisites: HUBIO 560P and permission of instructor.

REHAB 565 Assistive Technology in Rehabilitation and School System Practice (3) *Anson* Introduction to the use of assistive technology in rehabilitation and special education. Content includes set-up and use of alternative input systems on microcomputers and applications of technology to neuromuscular retraining, augmentative communication, and facilitation of learning in the classroom. Prerequisites: famil-

ilarity with basic computer operations and permission of instructor.

REHAB 566 Special Topics in Rehabilitation (1-9, max. 14) Philosophy and concepts in the interdisciplinary rehabilitation of persons with major disabilities, including advanced content in the rehabilitation theory and process of selected categories.

REHAB 567 Practicum in Rehabilitation (1-12, max. 24) Specialized practicum experience in environment providing rehabilitation services. Practicum arrangements and permission by instructor.

REHAB 568 Biophysics as Applied to Physical Medicine (2) *Esselman* Propagation and absorption characteristics of physical forms of energy used for treatment in physical medicine. Physiologic effects basic to prescription of the physical therapy modalities. Prerequisite: resident standing in rehabilitation medicine; others by permission of instructor.

REHAB 596 Electromyography and Clinical Neurophysiology (4) *Kraft* Didactic course covering electromyography and clinical neurophysiology. First part covers basic neurophysiology and second covers electromyography, nerve conduction studies, somatosensory-evoked potentials, residual- and auditory-evoked potentials, single fiber EMG, late response, quantitative analysis, and macro EMG. Prerequisite: residency in rehabilitation medicine; others by permission of instructor.

REHAB 597-598-599 Electromyography and Electrodiagnosis Laboratory (1-1-1) *Kraft* Elective work in clinical electromyography and other electrodiagnostic methods. Prerequisite: residency in rehabilitation medicine; others by permission of instructor.

REHAB 600 Independent Study or Research (*) Credit/no credit only.

REHAB 654P Second-Year Clinical Elective in Physical Medicine and Rehabilitation (8) *Haselkorn, Hays* Alternative to 685 to meet chronic-care requirement. Explores the same goals recognizing the limited skills of the first-year student. Structured contacts permit understanding of disability problems in patients with chronic disease. Treatment methods and psychosocial consequences explored. Prerequisite: completion of one year of medical school.

REHAB 685P Chronic Disease and Disability (4) *Hays* Meets chronic-care requirement for medical students. Structured clinical experience on rehabilitation medicine services. Differences between acute and chronic medicine, identification of disability problems, and therapeutic techniques for removing disability. Hospitals are within University system, local area, WAMI area, and Hawaii. Prerequisite: third-year medical student standing.

REHAB 686P Rehabilitation Medicine Clerkship—Pediatrics (8/12) *Hays, Jaffe, Massagli* Meets chronic-care requirement for medical students. Incorporates material of 685 and expands into disabling pediatric disease. School planning, family counseling, community support services included. Six-week package permits inpatient, outpatient, and consultation experience. Recommended for students contemplating pediatrics. Prerequisite: third-year medical student standing.

REHAB 687P Rehabilitation Medicine Clerkship—Medical (8/12) *Hays* Meets chronic-care requirement for medical students. Incorporates material of 685 and expands into disability problems associated with "nonsurgical" disease. Six-week package permits inpatient, outpatient, and consultation experience. Recommended for careers in family medicine, internal medicine, rheumatology, cardiology, neurology, and geriatrics. Prerequisite: third-year medical student standing.

REHAB 688P Rehabilitation Medicine Clerkship—Surgical (8/12) Hays Meets chronic-care requirement for medical students. Incorporates material of 685 and expands into disability problems associated with surgically related disease. Six-week package permits inpatient, outpatient, and consultation experience. Recommended for careers in orthopedic surgery, neurosurgery, cardiovascular surgery, and urology. Prerequisite: third-year medical student standing.

REHAB 689P Spinal Cord Injury (8/12) Hammond Introduction to diagnosis, management, rehabilitation of patients with spinal-cord injuries. Interaction with rehabilitation team, psychiatrists, and subspecialists in urology, neurosurgery, and plastic surgery. Performance at subintern level expected. Veterans Administration Medical Center only. Prerequisites: MED 665P, SURG 665P.

REHAB 695P Rural Rehabilitation Medicine Clerkship (8) Hays Structured clinical experience in identification and treatment of disability problems in rural (nonmajor urban) communities. Satisfies chronic care/rehabilitation medical graduation requirements. Prerequisites: completion of at least six months of clinical clerkships, permission of instructor.

REHAB 697P Rehabilitation Medicine Special Elective (*, max. 24) Equivalent to 686P, 687P, or 688P. Satisfies requirements in rehabilitation medicine/chronic care. Student arranges with another university, using the "Special Assignment Form." Students can qualify after review, similar experience at another university. Prerequisite: permission of instructor.

REHAB 700 Master's Thesis (*) Credit/no credit only.

Surgery

BB487 University of Washington Medical Center

The Department of Surgery carries out instruction during all four years of School of Medicine attendance. The third-year six-week clerkship constitutes the core of student exposure to general surgery and is required of all students. The fourth-year emergency-room clerkship is also a required part of the curriculum. The department also offers a variety of fourth-year elective clerkships in a number of the specialty aspects of the department's clinical activities, including but not limited to cardiothoracic surgery, plastic surgery, vascular surgery, transplantation, surgical critical care, and the management of burn patients.

Faculty

Chair

Carlos A. Pellegrini

Professors

Ashbaugh, David G. 1982, (Emeritus); MD, 1957, Ohio State University; thoracic surgery.

Beach, Kirk Watson * 1976, (Research); MSChE, 1968, PhD, 1971, University of California (Berkeley); MD, 1976, University of Washington; arterial disease in diabetes, blood flow studies with ultrasonic Doppler.

Bell Jr., Richard H. 1994; MD, 1971, Northwestern University; general surgery.

Clowes, Alexander W. 1980; MD, 1972, Harvard University; general and vascular surgery.

Copass, Michael K. 1973, (Adjunct); MD, 1964, MA, 1964, Northwestern University; neurology/emergency services.

Dellinger, E. Patchen * 1977; MD, 1970, Harvard University; general and gastrointestinal surgery.

Engrav, Loren H. 1977; MD, 1969, University of California (Los Angeles); plastic and reconstructive surgery.

Gruss, Joseph S. 1991; MBChB, 1969, University of Witwatersrand (South Africa); plastic surgery.

Heimbach, David M. 1974; MD, 1964, Cornell University; burn and general surgery.

Herman, Clifford M. 1977, (Emeritus); MD, 1959, University of Vermont; general surgery.

Johansen, Kaj H. 1978; MD, 1970, University of Washington; PhD, 1977, University of California (San Diego); general and vascular surgery.

Jurkovich, Gregory J. 1988; MD, 1978, University of Minnesota; general surgery.

Kohler, Ted R. 1983; MD, 1976, Harvard University; general and vascular surgery.

Maier, Ronald V. 1981; MD, 1973, Duke University; general surgery, trauma-critical care surgery.

Merendino, K. Alvin 1948, (Emeritus); MD, 1940, Yale University; PhD, 1946, University of Minnesota; general surgery.

Moe, Roger E. 1967; MD, 1959, University of Washington; oncology and general surgery.

Pellegrini, Carlos A. 1993; MD, 1971, University of Rosario Medical School (Argentina); general and laparoscopic surgery.

Perkins, James D. 1989; MD, 1979, University of Arkansas; transplant surgery.

Schilling, John A. 1974, (Emeritus); MD, 1941, Harvard University; general surgery.

Strandness, D. Eugene 1965; MD, 1954, University of Washington; vascular surgery.

Tapper, David 1983; MD, 1970, University of Maryland; pediatric surgery.

Verrier, Edward D. 1989; MD, 1974, Tufts University; cardiothoracic surgery.

Winterscheid, Loren C. 1957, (Emeritus); PhD, 1953, MD, 1954, University of Pennsylvania; general and thoracic surgery.

Zierler, R. Eugene 1984; MD, 1976, Johns Hopkins University; general and vascular surgery.

Associate Professors

Allen, Margaret D. 1985; MD, 1974, University of California (San Diego); cardiothoracic surgery.

Azik, Salim 1990; MBBS, 1976, University of London (UK); cardiothoracic surgery.

Cochran, R. Pat 1990; MD, 1978, Emory University; cardiothoracic surgery.

Egbert, Mark A. 1982, (Adjunct); DDS, 1981, University of Washington; oral and maxillofacial surgery.

Foy, Hugh M. 1978; MD, 1978, University of Nebraska; general surgery.

Gentilello, Larry M. 1990; MD, 1982, Albert Einstein College of Medicine; general surgery.

Helton, William S. 1981; MD, 1981, University of California (Irvine); general surgery.

Langdale, Lorrie A. 1985; MD, 1979, University of Washington; general surgery.

Lupinetti, Flaviano M. 1993; MD, 1978, Johns Hopkins University; cardiothoracic surgery.

Marsh, Christopher L. 1989; MD, 1980, Loma Linda University; transplant surgery.

Nicholls, Stephen C. 1986; MBChB, 1975, University of Auckland (New Zealand); vascular surgery.

Patterson, David R. * 1984, (Adjunct); PhD, 1982, Florida State University; treatment of acute pain, psychology of burn patients, psychological outcome of physical trauma.

Pohlman, Timothy H. 1984; MD, 1978, Rush Medical College; general surgery.

Radke, Hubert M. 1977; MD, 1954, University of Texas (Galveston); general and thoracic surgery.

Rand, Richard P. 1990; MD, 1981, University of Michigan; plastic and reconstructive surgery.

Sawin, Robert 1989; MD, 1982, University of Pittsburgh; pediatric surgery.

Vedder, Nicholas 1990; MD, 1981, Case Western Reserve University; case history, plastic and reconstructive surgery.

Assistant Professors

Anderson, Benjamin O. 1994; MD, 1985, Albert Einstein College of Medicine; oncology, general surgery.

Barr, Darlene 1991; MD, 1985, University of Alabama; transplant surgery.

Byrd, David R. 1992; MD, 1982, Tulane University; general surgery and oncology.

Gibran, Nicole 1990; MD, 1985, Boston University; general, burn, and trauma surgery.

Hatsukami, Thomas 1988; MD, 1982, University of California (Los Angeles); vascular surgery.

Hofer, Brad 1987; MD, 1980, Northwestern University; cardiothoracic surgery.

Isik, F. Frank 1990; MD, 1985, Mt Sinai School of Medicine; plastic surgery/control of angiogenesis.

Kunzelman, Karyn S. * 1991, (Research); PhD, 1991, University of Texas (Dallas); biomedical engineering - cardiac; anatomy and physiology.

Mann, Roberta 1992; MD, 1985, University of Texas, Southwestern; general and burn surgery.

McVicar, John 1990; MD, 1981, Duke University; transplant surgery.

Meissner, Mark H. 1985; MD, 1985, University of Colorado (Denver); general, vascular, and critical care surgery.

Panos, Anthony 1993; MD, 1980, University of Toronto (Canada); general, cardiovascular, and thoracic surgery.

Sikkema, Wesley 1967; MD, 1957, University of Michigan; general surgery.

Sinanan, Mika N. 1980; MD, 1980, Johns Hopkins University; general and laparoscopic surgery.

Wood, Douglas E. 1992; MD, 1983, Harvard University; thoracic surgery.

Instructors

Bliss, David P. 1993, (Acting); MD, 1985, University of Missouri; pediatric surgery.

Flaherty, Lynne C. 1984, (Acting); MD, 1984, University of California (San Francisco).

Foster, Kevin 1995, (Acting); MD, 1990, Medical College of Ohio; burn and general surgery.

Healey, Patrick J. 1993, (Acting); MD, 1987, Boston University; general and pediatric surgery.

Hobson, Charles E. 1995, (Acting); MD, 1987, University of Virginia; trauma and general surgery.

Horgan, Santiago 1995, (Acting); MD, 1990, University of Buenos Aires (Argentina); laparoscopic and general surgery.

Moonka, Ravi 1995, (Acting); MD, 1990, University of Pennsylvania; general surgery.

O'Keefe, Grant E. 1994, (Acting); MD, 1988, University of Alberta (Canada); trauma and general surgery.

Rochon, Yvan P. 1994, (Acting); PhD, 1991, McGill University (Canada); trauma research.

Lecturer

Clowes, Monika M. 1981; BA, 1954, University of Geneva (Switzerland); vascular wall biology, kinetics of smooth muscle proliferation, restenosis of vessels of angiography.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Course numbers with a P suffix are not graduate courses and are restricted to medical student enrollment only.

SURG 498 Undergraduate Thesis (*) Langdale Offered to those students who have engaged in undergraduate research in general surgery. Please see "Research Opportunities in the Department of Surgery". (Full- or part-time.)

SURG 499 Undergraduate Research (*) Langdale Provides an opportunity to participate in ongoing research projects or carry out an independent research project under supervision of Department of Surgery faculty. Practical experience in experimental design and execution is provided under direct supervision of selected faculty members. (Full- or part-time.)

SURG 505P Preceptorship in Surgery (1) Langdale Opportunity for first- and second-year medical students to gain personal experience with clinical faculty members in the community. Students observe general aspects of private practice, including clinical problems seen; practice limitation; doctor-doctor, doctor-patient, and doctor-nurse relationships in the office and hospital. Prerequisite: permission of department.

CONJ 585 Surgical Anatomy (1-3, max. 12) See Conjoint Courses.

SURG 600 Independent Study or Research (*) Langdale

SURG 665P Clinical Clerkship (*, max. 12) Langdale (Veterans Affairs Medical Center, Harborview Medical Center, Providence Medical Center, University of Washington Medical Center) Diagnosis and management of problems amenable to surgical therapy. Physiological basis of surgical care, differential diagnosis and decision making, and the basic principles of surgical management. Care of inpatients and outpatients, including participation in the operating rooms. Prerequisite: HUBIO 563P. (Six weeks. Limit: twenty students.)

SURG 668P Clinical Clerkship Boise (12) Diagnosis and management of surgical problems. Physiological basis of surgical care, differential diagnosis and decision making, and basic principles of surgical management. Care of inpatients and outpatients, including participation in the operating rooms. Fulfills graduation requirement for Surgery. Prerequisite: completion of HUBIO series. (Six weeks. Limit: two students.)

SURG 681P Peripheral Vascular Disease (4/8) Clowes (Veterans Affairs Medical Center) Peripheral arterial and venous problems, including methods of clinical evaluation; new diagnostic procedures; and the available methods of treatment. Patient workup, performance of diagnostic studies, and presentation of case material to the staff. Prerequisites: 665P, HUBIO 563P. (Two or four weeks. Limit: one student.)

SURG 682P Clinical Burn Care (*, max. 12) Heimbach (Harborview Medical Center) Offered on the burn unit of Harborview Medical Center. Exposure to the care of patients with thermal injury, including management of severe metabolic and septic problems and opportunity to participate in surgical procedures. Exposure to plastic and reconstructive

surgery. Prerequisite: 665P. (Four or six weeks. Limit: two students.)

SURG 683P Pediatric Surgery Externship (8/12) Tapper (Children's Hospital and Medical Center) Surgical conditions peculiar to the particular age group with a preponderance of congenital and neoplastic conditions that are amenable to surgical treatment. A reasonable background of knowledge in human embryology and genetics is recommended. Prerequisite: 665P. (Four or six weeks. Limit: two students.)

SURG 684P Trauma and Emergency Care (*, max. 16) Copass, Eisenberg (Harborview Medical Center, University of Washington Medical Center) Register for one or both segments of this course. Segment 1: emergency medicine and trauma at Harborview Medical Center with assignment to the emergency department. Emphasis on management of severely injured and critically ill patients. Segment 2: acute medicine at University of Washington Medical Center. Evaluate and treat ambulatory emergencies. Prerequisites: 665P, MED 665P. (Four weeks, third-year and fourth-year students. Limit: twelve students at Harborview Medical Center; three students at University of Washington Medical Center.)

SURG 685P Cardiothoracic Surgery Externship (*, max. 12) Verrier (University of Washington Medical Center) Serve as subintern, participate in patient care while learning cardiopulmonary hemodynamics of cardiac and thoracic surgery. Observe a wide variety of both cardiac and thoracic disease entities. Participate in the open-heart procedures in the operating room. Opportunity to gain additional understanding of physiology of cardiopulmonary bypass. (Four or six weeks. Limit: two students.)

SURG 686P Plastic Surgery Clerkship and Preceptorship (*, max. 12) Engrav (University of Washington Medical Center) Plastic surgery service at University-affiliated hospitals; includes patient workups and operating room experience with emphasis on learning the fundamentals of plastic surgery, wound management on animal specimens and in the emergency room. Includes wounds, burns, facial trauma, head and neck cancer, cosmetic surgery, skin tumors, hand surgery, and reconstructive surgery. Prerequisite: 665P. (Four or six weeks. Limit: two students.)

SURG 687P Transplantation Surgery Clerkship (8) Perkins (University of Washington Medical Center) Clerkship is in the University regional multi-organ transplantation center. Student participates fully in the care of all transplant patients, on twice daily multidisciplinary rounds, in pre-operative conference, and in the operating room and on the donor harvest team. Weekly didactic teaching sessions. Prerequisites: 665P and MED 665P. (Four weeks. Limit: two students.)

SURG 688P Subinternship in General Surgery (*, max. 16) Langdale (Veterans Affairs Medical Center, Harborview Medical Center, Providence Medical Center, University of Washington Medical Center) Offered on the general surgery wards of the University-affiliated hospitals. Diagnosis, preoperative care, and postoperative care; management of surgical emergencies, the ICU patient, and outpatient follow-up of discharged patients. Students function at the intern level under close supervision of the staff and house staff. Prerequisite: 665P. (Four or six weeks. Limit: seven students.)

SURG 689P Community Surgery Clerkship (8) Langdale Designed to supplement basics learned in 665. Excellent opportunity to participate in general, thoracic, vascular, and plastic surgery in a group practice in a smaller city. Recommended for students entering primary care. Prerequisites: 665 and permission of department. (Four weeks. Longview—one student; Couer d'Alene—one student.)

SURG 690P Alaska Native Medical Center Surgery Sub-Internship (12) Langdale Designed to supplement basics learned in 665. Excellent opportunity to

participate in general, thoracic, vascular, and plastic surgery in a specialized population of patients. Recommended for students entering primary care. Prerequisites: 665 and permission of department. (Six weeks. Alaska Native Medical Center, Anchorage—one student)

SURG 697P Surgery Special Electives (*, max. 24) Langdale Special clerkship, externship, or research opportunities can at times be made available at institutions other than the University of Washington. Students wishing to elect this course should obtain from the Dean's office a special assignment form at least one month before preregistration. Prerequisites: 665P and departmental permission. (Four, six, or twelve weeks.)

Urology

BB1115 Health Sciences

Urology is the surgical discipline concerned with diseases of the urinary tract in male and female systems. The science is broadly based: major areas of practical and investigative concern include congenital defects, cancer, renal pathology, reproductive biology, neuropathology, and transplantation.

Clinically, the field encompasses a large variety of technical skills including real time imaging and manipulation, endoscopy, and open surgery. The medical diagnosis and treatment are a large part of the discipline.

The department is actively involved in patient care, instruction, and research concerning the problems of urology. Training for medical students starts in the second year and continues through the third and fourth years. Training is also provided for residents, fellows, nurses and applied specialists. The department is responsible for a fully approved urology residency program. Contact the Urology Clerkship Coordinator at 685-3245 for further information.

Faculty

Chair

Paul Henry Lange

Professors

Ansell, Julian S. 1959, (Emeritus); MD, 1951, Tufts University; PhD, 1959, University of Minnesota; congenital defects and pediatric urology.

Barnes, Glover W. * 1969; MA, 1955, PhD, 1961, State University of New York (Buffalo); tissue, organ immunology.

Berger, Richard E. 1982; MD, 1973, University of Chicago; infertility, infectious diseases, impotence and prostrate disease.

Brawer, Michael K. 1989; MD, 1980, University of California (Los Angeles); benign and malignant prostate proliferative disorders.

Chapman, Warren H. 1962, (Emeritus); MD, 1952, University of Chicago; oncology and microsurgery.

Krieger, John N. 1982; MD, 1974, Cornell University; infectious diseases.

Lange, Paul Henry 1988; MD, 1967, Washington University; oncology, endourology and adult reconstruction.

Mayo, Michael Edward 1975; MBBS, 1962, St Thomas' Hospital Medical School (UK); neuro-urology and reconstruction, urodynamics.

Mitchell, Michael E. 1989; MD, 1969, Harvard University; pediatric urology and reconstruction.

Associate Professors

Bavendam, Tamara G. 1989; MD, 1981, University of Iowa; female urology and urodynamics.

Marsh, Christopher L. 1989; MD, 1980, Loma Linda University; transplant surgery.

Riley, Donald E. * 1982, (Research); PhD, 1976, University of Washington; pathogenic research and diagnosis involving DNA sequences.

Vassella, Robert L. 1989; PhD, 1974, University of Mississippi; tumor markers and immunology.

Assistant Professors

Carr, Michael C. 1993; MD, 1985, University of Cincinnati; pediatric urology.

Choongkittaworn, Ngamchit 1992, (Research); PhD, 1987, Washington State University; molecular biology of prostate cancer.

Defalco, Alfred J. 1989; MD, 1962, University of Rochester; urologic trauma, urodynamics and endourology.

Ellis, William J. 1991; MD, 1985, Johns Hopkins University; oncology, prostate disease.

Higano, Celestia S. 1984, (Adjunct); MD, 1979, University of Massachusetts; oncology.

Miller, Jane L. 1985; MD, 1985, University of Oklahoma; female urology and urodynamics, urologic trauma.

Yang, Claire C. 1993, (Acting); MD, 1988, Vanderbilt University; neurourology and electrophysiology testing.

Yao, Yue 1982, (Research); PhD, 1988, University of Washington; abnormal bladder development at molecular level including changes in collagen and hormone receptors.

Instructors

Grady, Richard W. 1996, (Acting); MD, 1990, University of Michigan; pediatric urology.

Kuhr, Christian S. 1988, (Acting); MD, 1988, University of Washington; multi-organ transplantation, urologic surgery.

Takeyama, Thomas K. 1989, (Acting); MD, 1985, Tufts University; biochemistry of prostate specific antigen.

Lecturer

Muller, Charles 1980; PhD, 1976, University of California (Berkeley); male fertility and sperm physiology.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Course numbers with a P suffix are not graduate courses and are restricted to medical student enrollment only.

UROL 498 Undergraduate Thesis (*) Brawer Provides an opportunity for medical students to write in the area of urology. Prerequisite: permission of sponsor and department.

UROL 499 Undergraduate Research (*) Brawer The student participates in current urologic research projects under supervision of full-time staff. Certain specific problems may be elected by the student. Elective for medical students. Prerequisite: permission of sponsor and department.

UROL 501P Urology Preceptorship (1) Brawer Individual experiences with one or more of the full-time department faculty members covering research, teaching, and patient care. Students observe activities in the clinic, hospital ward, operating room, and research laboratories. Prerequisites: first- or second-year medical student standing; permission of instructor.

UROL 525P Medical Disciplinary Board Procedures (2) Ansell Students learn about physician-patient interactions which produce complaints or malpractice claims. Students assigned to the Washington State Medical Disciplinary Board for two monthly meetings, evaluate current cases, present them to board members. Outstanding presentations go to the whole board. Warning: Cases are discussed only with the Board. Offered: AWSpS.

UROL 675P Urology Preceptorship (*, max. 8) Brawer Student follows a private practice preceptor in all of his or her work. Becomes acquainted with the office management of urological problems. Prerequisites: 680P, HUBIO 562P. (Two or four weeks.)

UROL 680P Urology Clerkship (*, max. 8) Bavendam, Berger, Ellis, Krieger, Mayo Full activities of clinical service. Basic principles of urology emphasized. Prerequisite: HUBIO 562P. (Two or four weeks.)

UROL 681P Female Urology (4) Bavendam, Miller Observation of cases of lower urinary tract disorders specific to women, emphasizing behavioral management and multidisciplinary care. Ninety-five percent of cases observed are women. Not intended as the only exposure to urology for students considering urology as career choice. Prerequisites: third or fourth year standing and permission of instructor.

UROL 685P Urology Subinternship (*, max. 12) Bavendam, Berger, Ellis, Krieger, Mayo Subintern is responsible for patient workups and for preoperative and postoperative care and participates in the operating room. Prerequisite: MED 665P or pediatrics basic clerkship, or permission of instructor.

UROL 690P Urology Specialties (*, max. 8) Brawer For those who wish further exposure to a specific aspect of urology. Students can spend time with one attending at University of Washington Medical Center, Harborview Medical Center, Children's Hospital and Medical Center, or Veterans Administration Hospital studying oncology, infections, infertility, stone disease, impotence, or other aspects of urology. Prerequisites: 680P and permission of instructor.

UROL 697P Urology Special Electives (*, max. 24) Brawer Special clerkship, externship, or research opportunities can at times be made available at institutions other than the University of Washington. Students wishing to elect this course should obtain from the Dean's office a special assignment form at least one month before preregistration. Prerequisite: permission of instructor. (Six or twelve weeks.)



School of Nursing

Dean

Sue T. Hegyvary
T318 Health Sciences

Associate Deans

Pamela H. Mitchell, Academic Programs
Marie J. Cowan, Research and Practice

Assistant Dean

Ruth F. Craven, Continuing Nursing Education
The School of Nursing offers programs leading to baccalaureate, master's, and doctoral degrees.

Gary Olson, Director, Academic Programs

Undergraduate Program

The School of Nursing prepares its graduates to function as generalists in professional nursing practice and to collaborate with other health-care providers. The six-quarter undergraduate curriculum emphasizes theory and clinical practice to ensure critical thinking, human caring, and clinical expertise. Clinical experiences are provided in institutional and community settings for preventive and acute care. Completion of the curriculum leads to a Bachelor of Science in Nursing degree and eligibility to take the licensure examination to become a registered nurse.

Students may be admitted to the University of Washington as prenursing majors. Courses required for admission to the nursing major include: written communication; problem solving, including statistics; life sciences, including inorganic and organic chemistry, human anatomy and physiology, nutrition, and microbiology; Visual, Literary, & Performing Arts (VLPA); Individuals & Societies (I&S), including growth and development; and electives to achieve a minimum of 90 credits. A minimum 2.0 cumulative GPA is required and a minimum grade of 2.0 must be obtained for each prerequisite course. As admission is competitive, the GPA for admission is usually significantly higher. Together with the application and transcript(s), applicants are asked to submit a statement discussing their choice of nursing as a professional career, a résumé outlining volunteer/paid health care experience, community service, multicultural experience, and a recommendation from an employer/volunteer coordinator. Applicants are required to come in for a proctored essay after the application deadline.

A four-quarter modification of the basic curriculum is available for the registered nurse who is able to validate selected nursing courses through written examination and who intends to complete a master's degree program. This B.S.N. completion program is available at UW Bothell and UW Tacoma.

Admission to the nursing major occurs once a year, in autumn quarter, with an application deadline of January 15. Selection is competitive. For information on admission criteria, specific prerequisites, and deadlines, as well as application forms, contact the Office of Academic Programs, School of Nursing, (206) 543-8735 or 1-800-759-NURSE.

Graduate Program

The School of Nursing offers graduate study leading to the degrees of Master of Nursing, Master of Science, and Doctor of Philosophy. At the master's level, programs are designed to provide opportunity for advanced study and research in nursing. The Master of Nursing program develops increased competence in selected areas of advanced practice nursing. The following focus areas are available: acute care nurse practitioner (cardiovascular/AIDS/oncology); advanced community health nursing (cross cultural nursing/occupational health nursing/policy and program development); care systems management; family centered pediatric nursing; nurse midwifery; perinatal nursing/neonatal nurse practitioner; psychosocial nursing; psychosocial nurse practitioner; family nurse practitioner; pediatric nurse practitioner; women's primary care nurse practitioner; adult/older adult nurse practitioner; options for individualized study. Research is an integral part of all programs. A thesis is required in the Master of Science program. The Master of Nursing program provides the option of a thesis or non-thesis project. Opportunities for functional preparation in teaching, care systems management, and clinical practice as a nurse practitioner are available. The School of Nursing offers a concurrent graduate degree program with the Department of Health Services in the School of Public Health and Community Medicine.

Part-time study is available in some programs. Course work may be started prior to formal admission to a program as a graduate nonmatriculated student (GNM). GNM status allows the student to earn up to 9 graduate-level credits which may be applied to a graduate program if the student is later admitted. Time limits for acceptance of courses taken as a GNM student are six years for a master's degree and ten years for a doctoral degree from the first course to completion of the degree.

The aim of the program at the doctoral level is to prepare scholars and researchers to expand the body of knowledge upon which the practice of nursing is based. The program provides for rigorous research training related to four fields of nursing science: (1) individual adaptations to health and illness; (2) family adaptations to health and illness; (3) environments: supporting and nonsupporting; and (4) clinical therapeutics. The Ph.D. in nursing science program is designed for individuals interested in careers in academia or for other types of leadership positions in health service agencies in which the ability to design, plan, and implement research in nursing is a critical requirement.

Special Requirements

In addition to the basic requirements for graduate status in the University, admission to premaster's status in the School of Nursing requires baccalaureate preparation with an upper-division major in nursing or equivalent, a basic course in statistics, Graduate Record Examination scores within the past five years, a statement of goals, three references, and at least one year of practice for most clinical programs. Admission is usually for autumn quarter. The application deadline for most master's degree pathways is February 1. Early application is encouraged, although late applications may be accepted on a space-available basis. Additional information may be obtained from the School of Nursing Office of Academic Programs.

Admission requirements for the doctoral program, in addition to the above, include Graduate Record Examination scores within the past five years, three references, a statement of goals for doctoral study which includes a description of area of research interest, and an example of scholarly work. The deadline for application to the doctoral program is February 1.

Financial Aid

A limited number of nurse traineeships are available for premaster's study. Other financial aid is available on a limited basis.

Teaching assistantships and research assistantships are available to a limited number of students. Priority for these appointments is given to predoctoral students.

Contact the Office of Academic Programs, School of Nursing, for current information.

Faculty

Professors

Allen, David G. * 1988; PhD, 1975, University of Iowa; philosophy of science, critical and feminist theory, psychosocial nursing theory.

Barnard, Kathryn E. * 1972; MSN, 1962, Boston University; PhD, 1972, University of Washington; ecological factors of child development.

Batey, Marjorie V. * 1956, (Emeritus); MS, 1956, PhD, 1968, University of Colorado (Boulder); sociological factors in health-care systems.

Benotiel, Jeanne 1970, (Emeritus); MS, 1961, University of California (Los Angeles); DNS, 1969, University of California (San Francisco).

Blackburn, Susan T. * 1973; PhD, 1979, University of Washington; high-risk infants and their families, infant care-giving interactions and environments.

Booth, Cathryn L. * 1980, (Research); PhD, 1974, Ohio State University; mother-infant interaction, observational methodology, child birth experiences and attachment.

Brandt, Patricia * 1981; PhD, 1981, University of Washington; influence of family functioning on early child development.

Brown, Marie A. * 1983; PhD, 1983, University of Washington; HIV infection, home care, women's health, death.

Chrisman, Noel J. * 1973; PhD, 1966, University of California (Berkeley); community partnership research, clinical cultural competence, ethnic health beliefs and practices.

Cowan, Marie J. * 1977; MS, 1972, PhD, 1979, University of Washington; estimation of infarct size by electrocardiography, sudden cardiac death, physiological nursing.

de Tornay, Rheba * 1975; EdD, 1967, Stanford University; health services, nursing education.

Dimond, Margaret * 1988; MN, 1971, University of Iowa; PhD, 1978, University of Wisconsin; aging, bereavement, family caregiving, Alzheimer's disease, chronic illness, long-term care.

Disbrow, Mildred A. * 1982, (Emeritus); PhD, 1968, University of Washington; maternal-infant interaction, child abuse.

Eggert, Leona * 1978; MA, 1970, PhD, 1984, University of Washington; adolescents, drug use, suicide, communication, personal relationships.

Eyres, Sandra J. * 1974; PhD, 1972, University of North Carolina; environmental resources promoting adaptation and health.

Gallucci, Betty J. * 1976; MS, 1971, PhD, 1973, North Carolina State University; oncology, nutritional assessment, pathophysiology of stomatitis, and graft versus host disease.

Giblin, Elizabeth C. * 1959, (Emeritus); MN, 1954, University of Washington; EdD, 1959, University of Colorado (Boulder); nursing assessment and nursing therapies, pathophysiological bases.

- Graham, Katherine J. 1988; MN, 1967, PhD, 1978, University of Washington; quality of life across life, work; health systems.
- Hegyvary, Sue T. * 1986; PhD, 1974, Vanderbilt University; administration and productivity of health care and nursing services.
- Heitkemper, Margaret M. * 1981; MN, 1975, University of Washington; PhD, 1981, University of Illinois; gastroenterology, enteral nutrition, gerontology.
- Horn, Barbara J. * 1977, (Emeritus); PhD, 1971, University of Michigan; effective organization of nursing resources.
- Killien, Marcia G. * 1973; PhD, 1982, University of Washington; women's health, reproductive decision making, work and family.
- Kogan, Helen N. * 1968; PhD, 1968, University of California (Los Angeles); stress response; cognitive/physiologic interface in chronic dysfunctions, self-management teaching.
- Lewis, Frances M. * 1978; PhD, 1977, Stanford University; complex organizational analysis, evaluation research, psychosocial factors in chronic illness.
- Little, Dolores E. 1951, (Emeritus); MN, 1957, University of Washington; physiological nursing.
- Mansfield, Louise W. 1951, (Emeritus); MA, 1951, Columbia University; physiological nursing.
- Mitchell, Pamela H. * 1971; MS, 1965, University of California (San Francisco); PhD, 1991, University of Washington; neuroscience nursing, diagnostic strategies.
- Muecke, Marjorie A. * 1979; PhD, 1976, University of Washington; medical anthropology, women's health, refugee health, Southeast Asia.
- Murphy, Shirley Ann * 1985; PhD, 1981, Portland State University; additive processes in women, coping with undesirable life events.
- Osborne, Oliver H. * 1969, (Emeritus); PhD, 1968, Michigan State University; ideology, policy and health care systems, transcultural health.
- Patrick, Maxine L. * 1973, (Emeritus); DPH, 1970, University of California (Los Angeles); gerontology, geriatrics.
- Pollack, Sylvia * 1968, (Research); PhD, 1967, University of Pennsylvania; cellular immunology.
- Price Spratlan, Lois * 1976; PhD, 1976, University of Washington; sexual harassment and perceived workplace mistreatment in higher education.
- Prinz, Patricia * 1976, (Adjunct); PhD, 1969, Stanford University; pharmacology.
- Shamansky, Sherry * 1988; DPH, 1977, Yale University; nursing administration and organizational culture.
- Shaver, Joan L. * 1980; MN, 1970, PhD, 1976, University of Washington; women's health and female reproductive physiology.
- Teri, Linda 1984, (Adjunct); PhD, 1980, University of Vermont; clinical psychology.
- Vitiello, Michael V. * 1982 (Adjunct); PhD, 1980, University of Washington; behavioral medicine, principles of behavioral sciences applied to medical research and practice.
- Weaver, W. Douglas 1979 (Adjunct); MD, 1971, Tufts University; cardiology.
- Webster-Stratton, Carolyn * 1976; PhD, 1980, University of Washington; parent intervention programs for behaviorally disturbed children.
- Wolf-Wilets, Vivian * 1969; PhD, 1969, University of Chicago; curriculum development, instruction, stress management.
- Woods, Nancy * 1978; PhD, 1978, University of North Carolina; women's health.
- Woods, Susan L. * 1975; MA, 1975, University of Washington; PhD, 1991, Oregon Health Sciences University; cardiovascular clinical specialist, pulmonary artery catheter measurement.

Associate Professors

- Beaton, Randal D. * 1976, (Research); PhD, 1972, University of Washington; assessment and treatment of temporomandibular joint pain and dysfunction.
- Betrus, Patricia * 1978; PhD, 1985, University of Washington; stress, cognitive behavioral therapy, depression, research design.
- Bevens, Stella H. * 1955, (Emeritus); MA, 1951, University of Minnesota; physiological nursing.
- Blainey, Carol * 1967; MN, 1967, University of Washington; clinical teaching and problems of patients with diabetes mellitus.
- Bond, Eleanor * 1985; MN, 1976, PhD, 1985, University of Washington; critical care nursing, therapeutic effects of exercise.
- Booser, Mary Kathryn * 1960, (Emeritus); MN, 1955, University of Washington; physiological nursing, care of patients.
- Brandt, Edna M. 1952, (Emeritus); MN, 1953, University of Washington; physiological nursing.
- Burke, A. Evelyn 1943, (Emeritus); MA, 1941, Case Western Reserve University; community health-care systems.
- Burr, Robert L. * 1976, (Research); PhD, 1986, University of Washington; cardiovascular/psychophysiology, autonomic nervous system.
- Bush, James P. 1984; MN, 1973, University of Washington; EdD, 1984, University of San Francisco; pain management, power and powerlessness as perceived by professional nurses.
- Carnovali, Doris 1982, (Emeritus); MN, 1961, University of Washington.
- Catanzaro, Marci Lee * 1982, (Emeritus); PhD, 1980, Union Graduate School-West; physiological nursing.
- Cobb, Marguerite 1953, (Emeritus); MN, 1957, University of Washington; community and school health problems.
- Craven, Ruth F. * 1968; MN, 1968, University of Washington; EdD, 1984, Seattle University; gerontological nursing.
- Cunningham, Susanna L. * 1978; MN, 1969, PhD, 1978, University of Washington; risk factors for atherosclerotic cardiovascular disease.
- Elmore, Shawn K. * 1983; PhD, 1990, University of Washington; psychobiological aspects of women with mood disorders and light therapy.
- Estes, Nada * 1972, (Emeritus); MS, 1958, University of Colorado (Boulder); counseling people with substance-use disorder, depression.
- Fine, Ruth Barney 1958, (Emeritus); MN, 1957, University of Washington; physiological nursing.
- Flagler, Susan B. * 1979; DNS, 1981, University of California (San Francisco); maternal role adjustment and early parent-infant interaction.
- Fought, Sharon G. * 1986, (Adjunct); PhD, 1983, University of Texas (Austin); emergency care/critical care nursing; simulation gaming educational strategies.
- Gray, Florence I. 1949, (Emeritus); MS, 1950, Washington University; undergraduate nursing education.
- Hammond, Mary A. * 1972, (Research); PhD, 1971, University of Wisconsin; child development, longitudinal research methods.
- Hoffman, Agnes * 1979, (Emeritus); PhD, 1977, University of Kansas; substance use disorders, mental health care of the elderly.
- Horn, Beverly M. * 1976; PhD, 1975, University of Washington; cross-cultural research in maternal-child nursing.
- Jarrett, Monica E. * 1989, (Research); MN, 1981, PhD, 1988, University of Washington; psychobiology of women.
- Jordan, Pamela L. * 1984; PhD, 1984, University of Michigan; expectant/new fatherhood, transition to parenthood.
- Kang, Rebecca R. * 1981; PhD, 1985, University of Washington; environment of at-risk infants and families.
- Kelly, Jean F. * 1986, (Research); PhD, 1979, University of Washington; family factors that affect at-risk children.
- Kieckhefer, Gail M. * 1987; PhD, 1985, University of Washington; motivation for health promotional and illness management behavior in children.
- Lalonde, Bernadette 1980, (Research); PhD, 1980, University of Toronto (Canada); evaluation research regarding quality of care, program evaluation.
- Lentz, Martha J. * 1984, (Research); MN, 1975, PhD, 1984, University of Washington; physiological adaptation: the influence of sleep and other biological rhythms.
- Lewis, Linda L. * 1989; MS, 1981, PhD, 1987, University of Illinois; reproductive neuroendocrinology mood changes related to the human menstrual cycle.
- Magyary, Diane L. * 1981; PhD, 1981, University of Washington; family centered health care of children at risk, disabled or handicapped.
- Mitchell, Ellen S. * 1977; MN, 1967, University of Florida; PhD, 1986, University of Washington; women's health; menstrual cycle symptom experience, food cravings and eating control.
- Molbo, Doris M. * 1969, (Emeritus); MA, 1968, University of Washington; oncology: prevention and screening, care and rehabilitation.
- O'Connor, Frederica W. * 1986; PhD, 1986, Northwestern University; psychoeducation in schizophrenia, mental health promotion, program evaluation.
- Olshansky, Ellen F. * 1985; DNS, 1985, University of California (San Francisco); psychosocial implications of infertility related to the family, qualitative research.
- Pesznecker, Betty L. 1970, (Emeritus); MN, 1957, University of Washington.
- Pittman, Rosemary 1964, (Emeritus); MS, 1947, University of Chicago.
- Schapp, Karen G. * 1988; PhD, 1985, University of Arizona; stress and coping of physically and mentally ill youth and their families.
- Schultz, Phyllis R. * 1989; PhD, 1981, University of Denver; nursing systems research, impact of nursing services on population's health.
- Spieker, Susan J. * 1983, (Research); PhD, 1982, Cornell University; developmental psychology, infant security, mother-infant interaction.
- Swanson, Kristen M. * 1985; PhD, 1983, University of Colorado (Boulder); caring therapeutics, responses to miscarriage.
- Thomas, Karen A. * 1981; PhD, 1986, University of Washington; preterm infant development, care unit environments, acute care pediatrics, thermoregulation.
- Thomas, Mary Durand * 1983; PhD, 1978, University of Hawaii; psychiatric illnesses, assessment and diagnostic reasoning, cultural aspects of care.
- Thompson, Frances Elaine A. * 1984, (Research); PhD, 1990, University of Washington; attribution theory, adolescent drug use, suicide.
- Wagnild, Gail M. * 1992; PhD, 1984, University of Texas (Austin); geriatric care in the community.

Ward, Deborah * 1987; PhD, 1987, Boston University; health policy and politics, women's paid and unpaid caregiving work.

Wilkie, Diana J. * 1990; MN, 1984, PhD, 1990, University of California (San Francisco); cancer pain assessment and management, pain research.

Assistant Professors

Belza, Basia * 1991; MN, 1982, University of Virginia; PhD, 1991, University of California (San Francisco); chronic illness, gerontology, fatigue prevention and management in rheumatic diseases.

Benfield, Rebecca D. 1995; MSN, 1985, University of Kentucky; PhD, 1993, University of South Carolina; nursing/midwifery.

Berry, Donna L. 1994, (Research); MN, 1981, University of Texas (Houston); PhD, 1992, University of Washington; cancer pain and symptom management.

Brown, Linda * 1991, (Research); PhD, 1982, University of Colorado (Denver); mental health care delivery system evaluation, theories of psychiatric nursing, nursing intervention.

Cochrane, Barbara B. * 1985, (Affiliate); PhD, 1992, University of Washington; women's health; individual adaptations to health and illness, clinical therapeutics.

Draye, Mary A. 1982; MPH, 1968, University of Michigan; FNP practice, infertility, computer-aided instruction, risk appraisal.

Ensign, B. Josephine 1994; MS, 1986, Virginia College of Medicine; MPH, 1992, DPH, 1994, Johns Hopkins University.

Frost, Diana Patterson * 1989; DNS, 1984, University of Alabama; childbearing family, pediatric primary health care.

Haberman, Mel R. 1982, (Affiliate); PhD, 1987, University of Washington; oncology nursing.

Heerwagen, Judith * 1981, (Affiliate); PhD, 1982, University of Washington; behavioral ecology.

Henderson, Dorothy J. 1994; MS, 1991, PhD, 1994, University of Michigan; substance abuse, women's health, feminist and critical theories, participatory action research.

Jones, Mary C. 1964, (Emeritus); MS, 1962, Boston University.

Kasprzyk, Danuta M. 1984, (Affiliate); PhD, 1984, University of Washington.

Landis, Carol A. * 1991; MS, 1973, DNS, 1988, University of California (San Francisco); health consequences of sleep loss, neuroendocrine-immune interactions, methods of inquiry.

Larson, Margaret L. * 1958, (Emeritus); MN, 1967, University of Washington; cross-cultural variables in mental illness, nursing interventions in disturbed behaviors.

Levine, Barbara 1989; MA, 1977, Boston College; PhD, 1993, Oregon Health Sciences University.

Martell, Louise K. * 1992; PhD, 1990, Oregon State University; maternal adaptations to childbearing.

Meyer, Kerry E. * 1992; MN, 1981, Vanderbilt University; PhD, 1990, University of Maryland.

Moniz, Donna M. 1986, (Affiliate); MN, 1975, JD, 1982, University of Washington.

Montano, Daniel E. * 1979, (Affiliate); PhD, 1983, University of Washington; attitude-behavior research and behavior change, cancer control, HIV prevention.

Nelson, Patricia A. 1994; MSN, 1973, University of Texas (Austin); EdD, 1984, Baylor University; depression in older adults, adolescent parenting, health care teams.

Oshio, Sachiko 1985; MS, 1981, Boston University; PhD, 1992, University of Washington; relationship de-

velopment; particularly between mothers and newborn infants.

Salazar, Mary K. * 1984; MN, 1986, University of Washington; EdD, 1991, Seattle University; behavioral theory applied to health education, cancer control, occupational health.

Schroeder, Carole A. 1993; MSN, 1985, University of Nevada; PhD, 1993, University of Colorado (Denver); women's health, community health, models of care delivery, health care systems.

Shannon, Sarah E. 1993, (Research); MSN, 1992, PhD, 1992, University of Washington; health care ethics, end-of-life decision making.

Sikma, Suzanne 1995, (Research); MSN, 1979, Loyola University; PhD, 1994, University of Washington; caring in organizations, development and evaluation of organizations, care delivery systems.

Simpson, Terri A. * 1991; MN, 1975, University of California (San Francisco); PhD, 1988, University of Washington; critical care patients' physiological and psychological responses to environmental stressors.

Smith, Mary E., 1994, (Clinical); PhD, 1983, University of Washington; pediatric nursing.

Spitzer, Ada 1993, (Affiliate); PhD, 1990, University of Washington; family stress with chronic childhood illness.

Strickland, Carolyn J. B. * 1991; MS, 1976, PhD, 1983, University of Washington; helath related behavior, complex organizations, American Indian populations.

Whitney, Joanne D. * 1991; MS, 1979, University of Michigan; PhD, 1991, University of California (San Francisco); wound healing.

Worthy, Elizabeth J. * 1966, (Emeritus); MN, 1964, University of Washington; mother-infant interactions, handicapped child.

Young, Heather M. 1991, (Research); MN, 1989, PhD, 1991, University of Washington; gerontology, housing for older adults, long term care, ethics.

Lecturers

Hancock, Lois A. 1978; MSN, 1978, Yale University; primary care nurse practitioner education.

Hoffman, Martha A. 1994; MN, 1978, University of Washington; maternal-infant health.

Jensen, Marilee M. 1990; MSN, 1988, University of Washington; women's primary care nurse practitioner.

MacLaren, Aileen 1994; MSN, 1982, University of Miami (Florida); midwifery.

Patteson, Dorothy M. 1984; PhD, 1995, University of Washington; perinatal-neonatal nursing.

Petersen, Karla Renee 1994; MN, 1988, University of Washington; primary care of children.

Ratcliffe, Marijo M. 1991; MN, 1984, University of Washington; pediatric pulmonary nursing.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

NURS 201 Growth and Development Through the Life Span (5) Focuses on processes of human growth and development from prenatal life to old age. Emphasizes influence of growth and development on achievement of health, and how awareness of growth and development theory and research helps guide health promotional efforts directed towards persons of various ages and life styles. Open to non-majors.

NURS 301 The Nature of Health and Caring (3) Scientific principles of nursing care of health clients. Emphasis on understanding multidimensional aspects of health; personal, environmental factors that support

healthy functioning patterns of individual clients; health promotion interventions. Underlying concepts: health, adaptation to life transitions, person-environment fit, client, caring, health promotion, health maintenance. Prerequisite: admission to nursing program.

NURS 303 Introduction to Professional Nursing (4) Focuses on nature of nursing, development of identity as nursing students and professional practitioners. Students consider their choices to be nurses; nurses' experiences past, present; experience of illness, health-seeking; nursing issues in context of overall American health care system; perspectives on nursing education. Prerequisite: admission to nursing program.

NURS 304 Bases for Understanding Human Responses I (2) This course and its companion, 308, are concerned with commonly occurring psychopathological and pathophysiological human responses to states of health and illness. They identify and describe the major concepts and principles necessary to understand disregulatory processes at the mind-body interface. Prerequisite: admission to nursing program.

NURS 305 Threats to Health (3) Challenges to health during transitions: birth and death, developmental and role changes, acute changes in health, chronicity, and personal network. Assesses health patterns in terms of risk, vulnerability, and resilience. Examines personal and environmental demands, constraints, resources for interaction with individuals, families, communities/populations undergoing transitions.

NURS 308 Bases for Understanding Human Responses II (3) Continuation and extension of 304. The two courses introduce and describe commonly occurring psychopathological and pathophysiological human responses to states of health and illness. They identify and describe the major concepts and principles necessary to understand disregulatory processes at the mind-body interface. Prerequisite: 304.

NURS 309 Pharmacotherapeutics in Nursing Practice (3) Introduces professional nursing students to the principles of pharmacology and drug therapies, pharmacologic-therapeutic classes of drugs, and important drug information resources. Prerequisite: admission to nursing program.

NURS 340 Clinical Nursing Phenomena (3) Selected clinical phenomena examined from the perspective of physiologic, pathophysiologic, experiential, and behavioral responses to life events and alterations in states of health and illness. Relationship of nursing therapies to each perspective and influence of life span and sociocultural factors identified. Prerequisite: admission to RN-Masters program or permission of instructor.

NURS 350 Decision Making and Therapeutics in Nursing (3) Focuses on types of thinking and writing germane to learning and practice in nursing including self-assessment, understanding and producing written communication, abstract thinking, group dialogue, evaluating points of view, problem solving, clinical decision making. Provides opportunity for application in discipline-related issues and frameworks. Prerequisite: licensed Registered Nurse.

NURS 401 Care in Illness I (5) Selected psychopathologic and pathophysiologic health alterations and therapies across life span. Assesses human functioning, pathophysiology, pharmacology, psychosocial, cultural variation, health care resources, and person-environment relationships to select nursing strategies for acutely and chronically ill individuals of all ages.

NURS 404 Interpersonal Therapeutics (3) Nursing care within context of interpersonal relationships. Effective enactment of nursing role requires knowledge of relationship development, maintenance and termination, using skillful interpersonal communication in diverse health-care contexts. Emphasizes applica-

tion of conceptual models in interpersonal processes and skills between professionals and clients, other professionals, and groups.

NURS 405 Care in Illness II (5) Continuation of 401, further examining selected psychopathologic and pathophysiologic alterations in health of individuals in context of families across life span. Emphasizes assessing functioning in psychosocial, cultural, person-environment relationships, and health care resources to plan nursing strategies for acutely/chronically ill individuals of all ages.

NURS 407 Cultural Variation and Nursing Practice (3) Introduces knowledge and skills for culturally competent health care for all. Compares health related values, beliefs, and customs among major cultural groups. Views family and social network as culturally variable health seeking behavior contexts. Examines Western biomedicine and alternative healing methods within broader environment, including government, other social institutions.

NURS 408 Nursing Care with Families in the Community (3) Application of biopsychosocial and social environmental theories and assessments to diagnose alterations in health/mental health of families, small groups in community settings. Emphasizes interpersonal and clinical therapies; coordination of community resources, evaluating effectiveness of changes; characteristics of nursing care in home visiting.

NURS 410 Legal and Ethical Issues in Clinical Practice (2) Identification of ethical and legal issues and the ensuing dilemmas relevant to the profession of nursing and nurses as health professionals and citizens. Selected problems and dilemmas affecting nurses, nursing, and the delivery of health care analyzed using specific moral-ethical perspectives. Prerequisite: upper-division standing or permission of instructor.

NURS 412 Nursing Care Systems (3) Introduction to analyzing current health care systems and their effectiveness in achieving desired health outcomes for selected client populations from a system perspective. Emphasizes key features of interface between client and health care professionals, and environmental factors and organizational structures which influence the transaction. Prerequisite: senior standing in nursing.

NURS 430 Interpersonal Relationships in Nursing (3) Theory, current research, and practice in communication to develop and maintain interpersonal relationships with clients and health care colleagues. Lecture/discussion and laboratory learning opportunities include concepts of relationship development and disorder, interpersonal and group therapeutic communication processes, health care interviewing, and social support. Prerequisite: admission to RN-Masters program or permission of instructor.

NURS 445 Topics in Physiological Nursing (1-10) Guided survey and discussion of current literature on major topics in physiological nursing. Seminar/lecture with analysis and discussion of selected topics and readings. May have clinical component. Implications for nursing practice and health care emphasized. Prerequisites: nursing majors, permission of instructor.

NURS 450 Connected Learning I (1, max. 6) An opportunity and quarterly requirement for nursing students to participate in a learning community in small groups with a faculty member. Focus is on dialogue, understanding others perspectives, building community, and integration of concurrent learning in other courses. Prerequisite: admission to nursing program.

NURS 451 Connected Learning II (1, max. 3) An opportunity and quarterly requirement for nursing students to participate in a learning community in small groups with a faculty member. Focus is on dialogue, understanding others perspectives, building community, and integration of concurrent learning in other courses. Prerequisite: admission to nursing program.

NURS 468 Continuing Education in Nursing (3) Planning, developing, and evaluating continuing education programs in various institutions and agencies. Includes the application of adult learning principles to a variety of situations, such as workshops, in-service and staff development programs. Prerequisite: graduate standing.

NURS 488 Youth at High Risk for Drug Abuse, Suicide Behaviors, Aggression, and Depression (3) Study of adolescent problem behaviors: causes, connections, and contexts. Two central themes are understanding vulnerability to drug abuse, suicide behaviors, and other related behaviors within social network contexts and exploring implications for prevention and early intervention programming. Recommended: senior or graduate standing.

NURS 489 Alcohol Problems in Family and Society (3) Analysis of family problems associated with alcoholism. Emphasis on psychological, cultural, and social implications; examination of various counseling practices employed and theories of prevention. Open to upper-division and graduate students. Prerequisite: permission of instructor.

NURS 492 Anthropology of Refugees (3) I&S The refugee phenomenon, its emergence in postcolonial world, and structure of life history of refugees. Ethnic change, involuntary deculturation, and acculturation as they occur in refugee life histories. Prerequisite: ANTH 202 or permission of instructor. Offered: jointly with ANTH 492.

NURS 495 Child Rearing, Culture, and Health (3) I&S Cross-cultural study of the child-rearing practices, cultural norms, and health behavior of children and adolescents in different societies. Comparative approaches, diverse theoretical postures, and empirical research findings are used. Prerequisite: permission of departmental adviser. Offered: jointly with ANTH 440.

NURS 500 Primary Care Management of Children and Adolescents with Special Health Needs (1-3) Brandt, Kieckhefer, Magyary, Schupp Advanced practice nursing with children and adolescents at high risk for or with physical, developmental, neurobiological, or psychosocial disorders. Focus on assessment, prevention, primary care management, and evaluation strategies. Includes community programs, multidisciplinary approaches, and health policy. Prerequisite: NCLIN 502 and permission of instructor. Offered: A.

NURS 501 Advanced Mental Health Interventions with Children (3) Brandt, Eggert, Magyary, Schupp Developmentally based assessment and therapeutic approaches relevant for children with psychosocial health problems. Consideration to matching therapeutic approaches with specific nature of symptomatology and other child, family, cultural, and environmental characteristics, including social and educational systems. Individual and group evaluation research emphasized. Prerequisite: 500. Offered: Sp.

NURS 502 Human Responses in Health and Illness I (3) Survey of selected human responses to environmental demands in health and illness as expressed at physiologic, pathophysiologic, experiential, and behavioral levels. Such concepts as host defenses, ventilation, circulation, elimination, and nutrition are discussed. Prerequisite: graduate standing.

NURS 503 Human Responses in Health and Illness II (3) Survey of selected human responses to environmental demands in health and illness at physiologic, pathophysiologic, experiential, and behavioral levels. Such concepts as immune response, stress response, circadian rhythms, pain, sleep, cognition, and consciousness. Prerequisite: graduate standing.

NURS 504 Clinical Nursing Therapeutics (1-6) Critical analysis of therapeutic modalities to assist patients with a variety of responses to health problems.

Includes selected therapies such as suction/drainage, positioning to address responses in critical, life threatening, and chronic/continuing health states. Varying credits assigned for modules covering particular therapies. Prerequisites: 502, 503, or permission of instructor.

NURS 505 Selected Topics in Psychosocial Nursing (2-10) In-depth exploration of the major theoretical issues in psychosocial nursing. Seminar with analysis and discussion of selected topics and readings and implications for research and health care.

NURS 506 Foundations in Psychosocial Nursing (3) Introduces students to Psychosocial Nursing by study of classic published papers. Current status of the specialty analyzed by review of standards of practice, certification criteria, and discussion of ethical, clinical, and educational issues. Examines visions and projected needs for the future.

NURS 507 Behavior and Adaptation: Elder Adults (3) Theory and research of behavior and adaptation in elder adults. Functional impairments within person-environment contexts. Intervention strategies based on psychodynamic, development, cognitive-behavioral, role theory, somatic, and self-help models. Prerequisite: permission of instructor.

NURS 508 Seminar in Group Treatment (2) Seminar on the theoretical basis for working with various treatment groups. Analysis of selected approaches to group treatment. Analysis of leader responsibilities and functions in the development of therapeutic group experiences.

NURS 509 Issues in Violence and Aggression for Health Professionals (3) Focuses on research and theory of violent/aggressive behavior. Perspectives of victim, offender, family, community, society examined. Focus is recognition of violence against women. Course is designed to challenge students to clarify beliefs, values related to topics such as rape, homicide, domestic violence. Prerequisite: graduate nursing student or permission of instructor.

NURS 510 Primary Care Foundations: Diagnosis and Management of Common Health Concerns (1-3 max. 9) Focus on diagnosis and management of common primary care problems of adolescents and adults, including older adults, within advanced nursing practice. Emphasizes individual and family responses and nursing strategies including differential diagnosis, treatment, patient education, and follow-up. Content focus changes each quarter. Prerequisite: permission of instructor. Recommended: concurrent field work.

NURS 511 Seminar in Neonatal Nursing (3) Neonatal neurobehavioral and physiologic adaptation within context of physical and social environment. Neonatal responses to alterations in growth and illness. Assessment modalities and therapeutic strategies used during the neonatal period. Prerequisite: 529 or permission of instructor.

NURS 512 Critical Interdisciplinary Approaches to Women's Health (3) Critical examination of the historical, socio-political, and scientific influences on women's health. Issues of sexism, racism, and heterosexism discussed from the perspective of different disciplines. Offered: jointly with WOMEN 512.

NURS 513 Women's Health: A Nursing Perspective (3) Critical analysis of contemporary and historical works relevant to nursing care for women across the life span. Synthesis of a holistic view of women's health to guide nursing practice and research. Prerequisite: graduate and senior undergraduate students.

NURS 514 Physiologic Adaptation in Women and Children (1-6) Analysis of developmental physiologic adaptations in four units: women/reproductive processes, pregnancy/postpartum, fetus/neonate, and infancy through adolescence. Emphasis on implications for nursing practice. Examination of research basis for selected intervention strategies.

- NURS 516 Nursing Management of Acutely Ill Children and Their Environments (1-5)** Nursing management of children with acute illnesses. Scientific principles, theories, and research used in planning, implementing, and evaluating nursing care of children at different levels of acuity and their families. Prerequisite: permission of instructor.
- NURS 517 Pediatric Pulmonary Anatomy and Physiology: Clinical Applications (2)** Lung development, anatomy, and physiology; clinical application when caring for children with acute and chronic lung disease. Prerequisite: permission of instructor.
- NURS 519 Curriculum Development in Nursing Education (3)** Theoretical rationale for curriculum development, study of curricular problems in nursing in relation to the elements of the curriculum as described in a curricular design. Prerequisite: graduate standing.
- NURS 520 Evaluation of Clinical Performance in Nursing (3)** For graduate students preparing for faculty or staff development positions in nursing. Theory and principles of evaluation. Instruments to appraise clinical nursing performance developed as part of course requirements. Prerequisite: graduate standing or permission of instructor.
- NURS 521 Communications in Complex Health-Care Systems (3)** Forum for critically examining and conceptualizing various communication processes in complex health-care systems and their implications for practice. Analytic and theoretical perspectives for the study of communication within health care. Prerequisites: 577, permission of instructor.
- NURS 522 Systems Analysis in Nursing Administration (3)** Examines concepts and techniques in industrial engineering, system analysis, and operations research applicable to decision making, control and monitoring functions in nursing administration. Student demonstrates application and critical appraisal of concepts and techniques. Prerequisites: ADMIN 510, or equivalent, and permission of instructor.
- NURS 523 Seminar in Care Systems Management (3)** Nursing science framework for analysis of the performance of care systems and of innovative change in care systems. Improving care through the use of leadership, quality improvement, and clinical and organizational effectiveness. For non-majors in care systems management.
- NURS 524 Conceptual Foundations for Care Systems Management (3)** Critical analysis of nature and theoretical bases of care systems management practice. Concepts of nursing and organization science foundations to person-provider transaction management and leadership in context of economic, political, and social environments and health outcomes. Prerequisite: graduate standing.
- NURS 525 Managing Clinical Effectiveness Within Care Systems (3)** Optimizing person-provider clinical therapeutic transactions at multiple levels of care systems complexity and population aggregation. Emphasis on designing, managing and evaluating clinical effectiveness and efficiency within care systems. Prerequisite: NURS 524 or permission of instructor.
- NURS 526 Managing Organizational Effectiveness Within Care Systems (3)** Analysis of management strategies for attaining effective and efficient organizational structures and processes within health care systems. Prerequisite: 524 or permission of instructor.
- NURS 527 Managing Effective Access and Utilization Within Care Systems (3)** In depth inquiry into health care access and resource utilization patterns among diverse populations, with emphasis on management strategies for establishing effective population-system fit.
- NURS 528 Implications of Human Embryology and Genetics for Clinical Practice (3)** Normal development of the human embryo and fetus and principles of human genetics. Alterations in development leading to common anomalies and implications for clinical practice. Prerequisite: graduate standing or permission of instructor.
- NURS 530 Conceptual Frameworks for Parent-Child Nursing (3)** Designed to assist graduate students in exploration, criticism, and analysis of selected concepts, frameworks, and models relevant to parent-child nursing practice. Group seminar work focuses on the discussion of issues influencing the roles and practice of clinical nurse specialists in parent-child nursing. Skills necessary for developing a conceptual framework for practice.
- NURS 531 Selected Topics in Parent and Child Nursing (1-6, max. 12)** In-depth examination of the literature pertinent to major theoretical issues in parent and child nursing. Seminar with analysis and discussion of selected topics and readings. Implications for research, prevention, and health care stressed. Prerequisite: permission of instructor.
- NURS 532 Professional Issues in Advanced Parent and Child Nursing (2-5)** History and current issues in advanced parent and child nursing practice and interface with health care systems. Advanced practice roles in provision, implementation, and evaluation of health care services for women, children, and families. Opportunity for application to specific advanced practice roles. Prerequisite: permission of instructor.
- NURS 533 Seminar in Cardiovascular Nursing (3)** Systematic inquiry into the influence of physical and emotional factors on pathophysiology underlying selected cardiovascular conditions; group study of current therapies with emphasis on prevention and rehabilitation. Individual study of topic of interest.
- NURS 534 Seminar in Nursing in Gerontology (3)** Gerontological research findings applied to complex nursing problems in maintenance of health and maximum functioning in the aged.
- NURS 535 Seminar in Neuroscience Nursing (3)** Guided survey of clinical and experimental literatures regarding selected concepts of human functioning mediated by the nervous system: consciousness, mentation, movement, sensation, integrated regulation, coping with disability. Clinical and research measurement, current research and implications for further research, clinical applications.
- NURS 536 Biological Aspects of Cancer: Implications for Care (3)** *Gallucci, Wilkie* Survey of major concepts from tumor biology and implications for advanced oncology nursing practice. Areas covered include carcinogenesis, cancer epidemiology, pathology, metastasis, treatments (chemotherapy, radiation, surgery, immunotherapy), and cancer detection and prevention. Discussion of role of advance nurse clinician and complex patient responses are incorporated into discussion of basic biological concepts.
- NURS 537 Pain Management: Pharmacological and Nonpharmacological Therapeutics (3)** Course focuses on nursing management of pain as a multidimensional phenomenon. Pharmacologic and non-pharmacologic therapeutics are critically reviewed for appropriateness in treatment of acute, chronic, and cancer pain. Nursing actions to initiate and maintain optimal therapy, based on individual responses, are reviewed and evaluated. Research-based clinical decisions are practiced.
- NURS 538 Management of Adults With Respiratory Dysfunction (3)** In-depth examination of problems such as abnormal secretions and shortness of breath associated with respiratory dysfunction due to pulmonary diseases and other pathophysiological states.
- NURS 539 Seminar in Critical-Care Nursing (3, max. 9)** Systematic inquiry into pathophysiology, initial nursing management, and systems of care for the critically ill adult or child.
- NURS 540 Special Topics in Physiological Nursing (3-6, max. 9)** Guided survey of the experimental literature of major topics in physiological nursing, including cardiopulmonary, biology of aging, neuromuscular, cancer, and endocrine. Course conducted as a seminar with analysis and discussion of selected topics and readings. Implications for future research and health care are emphasized.
- NURS 541 Care of Well Women (4)** Examines components the components of advanced nursing/midwifery care of well women. Emphasis on assessment, diagnosis, and management of common health issues and problems of women across the life span. Prerequisite: permission of instructor.
- NURS 542 Care During Childbearing I (4)** Advanced nursing/midwifery care and management of the low-risk childbearing woman and fetus through preconception, prenatal, intrapartum, and postpartum periods. Prerequisite: NURS 514.
- NURS 543 Care During Childbearing II (4)** Advanced nursing/midwifery care and management of childbearing women and fetus at risk for health problems throughout the prenatal, intrapartum, and postpartum periods. Primary management, collaborative management, and referral of at-risk clients. Prerequisites: 514 and 542 or permission of instructor.
- NURS 544 Psychosocial Adaptations of Individuals and Families during the Perinatal Period (3)** Adaptation of individuals and families during the perinatal period, with emphasis on psychosocial adaptation, consumer education, transition to parenthood, parent-infant interaction and community based support. Prerequisite: permission of instructor.
- NURS 545 Care of the Neonate and Infant (2)** Adaptation of neonate to the extrauterine environment and continuum of care to promote the health of infants within the context of family, community, and other environments. Prerequisites: 514, 528, or permission of instructor.
- NURS 546 Interpersonal Aspects of Behavior (3)** Selected theories in relation to psychosocial development and adaptation across life span for individuals, families, and small groups and as explanatory models of major psychosocial disabilities. General and psychosocial nursing models evaluated for heuristic value for research and practice. Prerequisite: graduate standing or permission of instructor.
- NURS 547 Biologic Aspects of Psychosocial Disabilities (3)** Analysis of biological processes influencing psychosocial behavior in response to internal and external stimuli. Research and theory of neuroendocrine mechanisms in psychosocial disabilities. Analysis of nursing management and evaluation of biopsychosocial modalities used in modification of behavior. Prerequisite: graduate standing in nursing or permission of instructor.
- NURS 548 Socioecological Dimensions of Community Mental Health (3)** Socioecological and sociocultural theories of mental health disabilities analyzed. Conceptual trends and intervention strategies evaluated with community and client-centered emphasis on mental health service delivery to high-risk and underserved populations, including the moderately and severely mentally disabled. Prerequisite: graduate standing in nursing or permission of instructor.
- NURS 549 Assessment in Psychosocial Nursing (4)** Concepts, methods, and clinical approaches to psychosocial nursing assessment. Basic principles of measurement as they apply to psychosocial nursing assessment diagnosis and intervention. Knowledge synthesized from psychosocial nursing and allied disciplines tested. Clinical assessment laboratory included.

NURS 550 People of Color, Psychosocial Health, and the Culture of Oppression (3) Explores relationships among the psychosocial health of people of color, American cultural patterns of intersecting forms of oppression (e.g., gender, race, and class) and the role of health professionals in defining, ameliorating and/or aggravating psychosocial distress. Prerequisite: experience with mental health professionals and ethnic identities among various people of color.

NURS 551 Theoretical Foundations of Primary Care (1-3) Presentation and interpretation of theoretical basis of advanced nursing practice in primary care. Provides students with conceptual foundation upon which to base their development as nurse practitioners. Prerequisites: graduate standing; permission of instructor.

NURS 552 Health Promotion (2-3) Emphasis on health promotion, screening, and disease prevention in primary care. Examination of individual and family wellness, models of risk assessment and behavior change, health promotion strategies, and barriers to achieving health. Opportunity to explore age-related health risks. Prerequisites: graduate standing and permission of instructor; recommended: nurse practitioner students take fieldwork concurrently.

NURS 553 The Mentally Ill Offender in Correctional and Community Settings (3) *Brown* Survey of social, political, economic, legal, and moral problems posed by individuals with mental disorders who commit crimes. Covers historical antecedents and current responses of correctional and mental health systems to mentally ill offenders, prevalence and correlates of incarceration, and roles of professionals in correctional mental health field. Credit/no credit only. Offered: W.

NURS 554 Psychosocial Interventions in Nursing (3) Conceptual foundations and interpersonal skills for interventions to promote personal change. Application made to nursing care of persons with psychosocial or physical health problems. Lecture-discussion and in-class practice. Prerequisites: graduate standing in nursing or permission of instructor.

NURS 555 Memory Theory and Implications for Health Care (3) Presents comparative analysis of research, theories of memory and their physiological basis. Means of measuring memory are critically evaluated. Current clinical problems and the therapeutic and care interventions using memory theory and rehabilitation are evaluated. Prerequisite: graduate or advanced undergraduate standing, or GNM or NM standing with permission of instructor.

NURS 556 Biopsychosocial Perspectives on Addictions (3) Psychosocial and pathophysiological aspects of substance use examined for their effects on individuals and families throughout life span. Theories and empirical findings serve as basis for evaluating preventive and therapeutic nursing approaches to substance use disorders, including those related to target populations. Prerequisite: basic course in biological sciences.

NURS 557 Psychosocial Approaches to Assessment and Management of Pain (3) Critically analyzes and integrates psychological and sociocultural models of acute and chronic pain. Commonly employed psychosocial pain assessment protocols and treatment modalities reviewed and evaluated. Non-pharmacological and non-invasive therapies evaluated for efficacy in treating pain. Prerequisite: advanced undergraduate or graduate studies in nursing, psychology, dentistry, medicine, or allied health professions.

NURS 559 Theories of Psychiatric Disabilities (3) Theories from psychosocial nursing, psychiatry, and behavioral sciences explanatory of psychiatric disabilities provide basis for identifying psychosocial problems and developing nursing diagnoses. Structure and functions of mental health organizations and social networks analyzed for more effective system

management by nurses. Prerequisites: NURS 547 or permission of instructor.

NURS 560 Dynamics of Community Health Practice (3/5) Examination of and experience with principles of clinical practice in community settings. Included are family as community constituent, populations at risk, community assessment, and community development. Prerequisites: graduate standing or permission.

NURS 561 Selected Topics in Comparative Nursing Care Systems (2-3, max. 10) In-depth examination of the literature pertinent to major theoretical issues in cross-cultural nursing and health-care systems. Seminar with analysis and discussion of selected topics and readings. Implications for research and health care stressed.

NURS 562 Clinically Applied Anthropology (3) Anthropology as it relates to interdisciplinary delivery of culturally relevant health care. Cultural variation in illness beliefs and behavior, types of healing practices, illness prevention, social support networks. Prerequisites: graduate standing, permission of instructor. Offered: jointly with ANTH 562.

NURS 563 Advanced Community Health Nursing (3) Systematic inquiry into the nature and foundations of community health nursing. Analytic and theoretical perspectives on health risk assessment and nursing interventions in the community. Implications for community health nursing services. Prerequisites: permission of instructor and graduate standing.

NURS 565 Self-Management Strategies and Techniques in Patient Care (3) Theories underlying cognitive/behavioral self-management strategies and techniques in patient care. Evaluation of the clinical appropriateness and utility for nursing. Application to such clinical problems as abstinence in the recovering alcoholic, depression, and eating disorders. Prerequisite: graduate standing or permission of faculty.

NURS 566 Occupational Stress and Stress Management (3) Relationships between occupational stressors and worker's health, well-being, productivity. Analyzes models of occupational stress. Investigates similarities, differences between job-related stressors and stress responses in various occupations. Explores elements of worksite stress management programs. Prerequisites: graduate standing in nursing or allied health discipline; advanced undergraduates with permission of instructor.

NURS 567 Theoretical Basis of Management of Stress Response (3) Theories of physiologic responses linked to theories of cognitive/affective and behavioral responses to stressors. Conceptual basis of self-management techniques. Research findings relevant to these theories and techniques examined and analyzed. Prerequisites: course in human physiology or physiologic psychology, permission of instructor.

NURS 569 Consultation in Human Service Systems (3) Exploration of theoretical perspectives and concepts relevant to consultation in human service systems. Models for intervention evaluated. Students design consultation projects, implementation determined through negotiation with faculty and agency representatives. Prerequisites: fourth-quarter placement or faculty permission; access to consultee system.

NURS 570 Family Concepts: Health and Illness (3) Emphasizes the family as unit of care across the life span. Predominant themes: factors influencing family health promotion, including resilience, vulnerability, risk reduction, and health policy; continuity, change and transition; and promotion of family health during acute and chronic illness episodes.

NURS 571 Advanced Interpersonal Therapeutics with Families (3) Models and research on therapeutic relationships and interpersonal processes evaluated and applied to group interactions among family

members, among professionals, and between the family, professionals, and macrosystems. Partnership building emphasized. Individual and group characteristics examined across the life span in social, cultural, and health contexts. Prerequisite: permission of instructor.

NURS 572 Family Nursing Therapeutics: Behavioral Models (3) Behavioral models of health-related behavior analyzed to develop therapeutic programs and services for families experiencing health-related concerns or disruptions. Seminars introduce didactic material and laboratory assignments facilitate development of therapeutic and programmatic content. Prerequisite: permission of instructor.

NURS 574 Family Nursing Therapeutics: A Systems Perspective (3) *Brandt, Comman, Schepp, Stetzel* Family models and research evaluated for relevance to advanced nursing practice and the family as a system. The interrelatedness of the individual, family, and social and health contexts examined. Experiential learning laboratories with family case analyses enhance knowledge and therapeutic skills. Prerequisite: permission of instructor.

NURS 575 Death Influence in Clinical Practice (2-4) Analysis and study of social, cultural, and psychological conditions that influence human death in modern society. Research findings, selected readings, and direct experience provide direction for examination of philosophic, theoretical, and pragmatic issues underlying choices and decisions in clinical practice. Open to graduate students with permission of instructor. (Limit: sixteen students.)

NURS 576 Populations at Risk in the Community (3) Health needs and risks of selected populations in the community and theoretical and analytical perspectives on assessment and intervention strategies in community health nursing practice with groups and populations whose health is at risk. Prerequisites: graduate standing and permission of instructor.

NURS 577 Seminar in Nursing and the Social Order (3, max. 9) Changing patterns of nursing service and education in contemporary society. Implications of personal value systems. Prerequisite: permission of instructor.

NURS 578 Health, Care, and Community (3) Analysis of health care in community from nursing and behavioral science perspectives. Sociocultural influences on health beliefs and practices, natural-care units, and community life patterns analyzed. Community as both context and target of change explored in relation to nursing approaches in health promotion and maintenance. Prerequisite: graduate standing.

NURS 579 Transcultural Nursing Practices (3) Study of nursing practices in different cultures. Seminar focus is on theoretical formulations and comparative analysis of values, patterns, techniques, and practices of nursing care in many societies. Rituals, myths, taboos, and beliefs are studied in relation to the subculture(s) of caring and nursing practices.

NURS 580 Theory Building in Nursing I (3) Exploration and analysis of nursing theory, types, techniques of construction, problems in evaluation and testing, and implications for nursing science. Prerequisite: permission of instructor.

NURS 581 Theory Building in Nursing II (3) Continuation of 580 with emphasis on evaluation of existing nursing theories, student construction and presentation of a theory for nursing, and critiques of the students' theories. Prerequisite: 580.

NURS 582 Environments, Supporting and Non-supporting (3) Analysis and study of environments as complex multidimensional systems that support or do not support human health. Emphasis on the influence of different conceptualizations of human-environmental interactions. Prerequisites: graduate standing, a minimum of 5 credits in basic nursing research

methodology at graduate level, and permission of instructor.

NURS 583 Philosophical Bases of Nursing Inquiry (3) Exploration of contemporary views of knowledge and science, focusing on ways in which these traditions influence nursing inquiry. Examination of nature of scientific knowledge development. Emphasis on underlying assumptions of various approaches to knowledge generation, along with the implications those methods of inquiry have for nursing knowledge development. Offered: A.

NURS 584 Clinical Therapeutics (4) *Barnard, Brown, Shaver* Analysis and study of current theories and knowledge regarding physical and interpersonal therapeutic measures and nursing interventions that promote, maintain, or restore health status to humans throughout life span. Prerequisites: graduate standing and minimum of 5 credits of basic nursing research methodology at graduate level and permission of instructor. Offered: Sp.

NURS 585 Individual Adaptations to Wellness and Illness (3) Survey and analysis of current theory and research in health and illness awareness, in health-seeking and -maintaining behaviors, and in coping responses to illness and disability. Prerequisites: graduate standing and a minimum of 5 credits of basic nursing research methodology at graduate level and permission of instructor.

NURS 586 Family Adaptations to Wellness and Illness (3) Current theory and research in family functioning in health and illness. Family developmental tasks, separation, divorce, major and minor disabilities, social cultural processes, and other events that strengthen or weaken the family. Prerequisites: graduate standing and a minimum of 5 credits of basic nursing research methodology at graduate level and permission of instructor.

NURS 591 Advanced Seminar in Nursing Science (3, max. 15) In-depth analysis and evaluation of literature in focused areas of research. Synthesis of literature related to selected fields of nursing science. Oral analysis of assigned papers and topics. Prerequisite: graduate standing or permission of instructor.

NURS 599 Selected Readings in Nursing Sciences (1-3, max. 18) Analysis of synthesis of selected readings with faculty mentor. Credit/no credit only. Prerequisite: permission of instructor.

Nursing Methods

NMETH 403 Introduction to Research in Nursing (3) Organization of the structure of nursing knowledge through research. Concepts and processes of research utilized in the investigation of nursing science. Prerequisite: one introductory statistics course.

NMETH 499 Undergraduate Research (1-5, max. 12) Supervised individual scholarly inquiry on a specific nursing problem. Nursing students only. Permission of academic programs office.

NMETH 520 Methods of Research in Nursing (3) Research process as it applies to nursing. Use of the literature in building theoretical rationale. Selection of appropriate methods. Presentation of findings. Minimum of two laboratory hours weekly. Prerequisite: a course in statistics.

NMETH 521 Methods of Research in Nursing (2) Continuation of 520, with emphasis on methods of research applied to the solution of problems in all fields of nursing.

NMETH 570 Seminar in Clinical Research in Nursing (3) Philosophy, problems of design; use of criterion measures in terms of patient care.

NMETH 575 Methodological Issues in Family Research (3) Emphasizes research with the family as unit of analysis. Examines patterns of family functioning in relation to responses to health situations. Reviews

family units from generational and intergenerational perspectives. Critiques methods assessing dyadic and triadic relationships and therapeutic interventions on family outcomes. Prerequisite: permission of instructor.

NMETH 588-589 Advanced Problems in Nursing Research (3-3) Examination of alternative methodological decisions for their direct and indirect consequences at different points in nursing research process. Prerequisites: inferential statistics; minimum of 5 credits of basic nursing research methodology at graduate level and permission of instructor.

NMETH 590 Special Topics in Nursing Research (2-3, max. 9) Examination of a specific research method, with evaluation of appropriateness, efficiency, rigor of measurement, and potential for inference for nursing research. Prerequisites: minimum of 5 credits of basic nursing research methodology at graduate level and permission of instructor.

NMETH 598 Special Projects ([1-12]-) Fulfills the requirements of the non-thesis option for Masters students in nursing. Projects involve scholarly inquiry with in-depth focused analysis, culminating in a written product/report for dissemination. Credit/no credit only. Prerequisites: 520 and 521 or permission of instructor.

NMETH 600 Independent Study or Research (*) Credit/no credit only.

NMETH 700 Masters Thesis (*) Credit/no credit only.

NMETH 800 Doctoral Dissertation (*) Credit/no credit only. Prerequisite: permission of Supervisory Committee chairperson or graduate program adviser.

Nursing Clinical

NCLIN 302 Practicum: The Nature of Health and Caring (5) Emphasizes beginning nursing skills in communication, interviewing, and health assessment and maintenance. Predominant themes include: personal health beliefs, values clarification, basic communication skills, and beginning physical and psychosocial assessment of the individual across the age span. Prerequisite: concurrent registration in NURS 301.

NCLIN 306 Practicum: Threats to Health (4) Beginning nursing skills in communication, interviewing, health assessment, identification of threats to health in selected community/clinical settings. Predominant themes, skills: risk, vulnerability identification; communication; physical, psychosocial assessment of individuals across life span; nursing care planning, documentation; psychomotor skills development. Prerequisite: 302 and NURS 301, 304; 305 which may be taken concurrently.

NCLIN 402 Practicum: Care in Illness I (4) Provides supervised nursing care to individuals and families with acute and chronic illness. Emphasis on increasing skill in systematic assessment, developing competency in selected nursing therapies, and developing role as care agent for persons of all ages. Credit/no credit only. Prerequisite: NURS 401 which may be taken concurrently.

NCLIN 406 Practicum: Care in Illness II (4) Provides supervised nursing care to individuals and families with acute and chronic illness. Emphasis on increasing skill in systematic assessment, developing competency in selected nursing therapies, and developing role as caring agent for persons of all ages. Credit/no credit only. Prerequisites: 402; and NURS 405 which may be taken concurrently.

NCLIN 409 Partnerships in Community Health (6) Analysis, application, and evaluation of nursing process at level of community. Formulation of community health diagnoses as basis for community-level interventions to maintain and promote biopsychosocial health, prevent disease, and enable self care by the community. Analysis of nursing's role in community

health/mental health. Prerequisites: 406 and NURS 405, 407.

NCLIN 411 Transition to Professional Practice (12) Intensive field work in a nursing care specialty focusing on critical examination, synthesis, and evaluation of professional nursing care. Client populations include individuals and/or groups reflecting diverse settings, ages, ethnic communities. Emphasizes mastering theoretical concepts, applying research findings, improving skill competency, developing leadership capabilities. Prerequisites: 406 and NURS 405, 407.

NCLIN 501 Health Assessment for Advanced Practice (1-5) Provides framework for systematic data collection, organization, precise recording, and accurate communication of health status data on individuals of all ages. Demonstrations of, and experiences with, the processes of symptom analysis and health screening with basically healthy individuals. Credit/no credit only. Prerequisites: graduate standing, permission of instructor.

NCLIN 502 Pediatric Health Assessment and Promotion (1-5) Gives experience in obtaining a health history and performing a physical assessment of infants, children, and adolescents. Interviewing techniques, problem-oriented charting, and a systems approach to the physical examination. Emphasis on screening principles, health promotion, and wellness care for children/families. Credit/no credit only. Prerequisite: permission of instructor.

NCLIN 503 Advanced Fieldwork Community Health Nursing (2-6, max. 12) Guided experience in delineating nursing roles in community settings. Development of a philosophy of community health nursing. Application of core concepts pertaining to health, ethics, care, and community. A minimum of four hours of guided experience weekly. Prerequisites: graduate standing and permission of instructor.

NCLIN 508 Seminar in Group Treatment (1) Seminar on the theoretical basis for working with various treatment groups. Analysis of selected approaches to group treatment. Analysis of leader responsibilities and functions in the development of therapeutic group experiences.

NCLIN 509 Practice Teaching in Physiological Nursing (3) Guided experience in selected teaching-learning situations in nursing, in both classroom and clinical situations. Identification, analysis, and solution of teaching-learning problems in clinical nursing. Minimum of seven hours of guided experience weekly.

NCLIN 510 Group Work with High-Risk Youth (3-6) Theory and application course in group counseling for high-risk youth. Central theme is group leader effectiveness in helping young people increase school performance, decrease drug involvement, and increase emotional well-being. Open to graduate students in nursing, education, and related human services professions.

NCLIN 512 Advanced Practicum in Parent and Child Nursing I (2-12, max. 25) Clinical seminar and practicum provide opportunities to develop advanced nursing practice competencies in the care of women, parents, children, and/or adolescents. Application of theory and principles to direct care, consultation, education and/or care coordinator roles with individuals and/or groups.

NCLIN 514 Seminar in Home Care for Chronic Illness (3) Home-care services as component of community health nursing. Understanding effects of direct nursing functions on care of chronically ill persons and their families. Selected field study experiences in community health settings. Prerequisites: NURS 563, graduate standing, and permission of instructor.

NCLIN 518 Pediatric Pulmonary Nursing (2-5) Applies knowledge of pediatric anatomy and physiolo-

ogy to assessment and treatment of pulmonary pathophysiology in children. Nursing issues in caring for children and families with acute and chronic lung disease. Prerequisite: permission of instructor.

NCLIN 525 Managing Clinical Effectiveness Within Care Systems (1) Optimizing person-provider clinical therapeutic transactions at multiple levels of care systems complexity and population aggregation. Emphasis on designing, managing and evaluating clinical effectiveness and efficiency within care systems. Prerequisite: NURS 524 or permission of instructor.

NCLIN 526 Managing Organizational Effectiveness Within Care Systems (1) Analysis of management strategies for attaining effective and efficient organizational structures and processes within health care systems. Prerequisite: NURS 524 or permission of instructor.

NCLIN 527 Managing Effective Access and Utilization Within Care Systems (1) In depth inquiry into health care access and resource utilization patterns among diverse populations, with emphasis on management strategies for establishing effective population-system fit.

NCLIN 528 Advanced Practice in Care Systems Management (4-8) Analysis of relationship between theory and practice in real-time conditions. Comparative analysis of structure and behavior of management approaches. Prerequisite: core courses in Care Systems Management.

NCLIN 531 Nursing Process in Parent-Child Nursing (4) Includes lecture, seminar, and laboratory instruction designed to assist the student with knowledge and skill acquisition related to nursing care of individuals and families with regard to childbearing and childrearing. Prerequisite: NURS 530.

NCLIN 541 Clinical Physiological Nursing Seminar I (1-10, max. 10) Guided experience in nursing practice with selected individuals in a specialized field of nursing. Synthesis and application of relevant principles and theories from biological, behavioral, and pathological sciences; proficiency in comprehensive nursing assessments, interventions, and evaluations; effective collaborative functioning as a member of the health team.

NCLIN 544 Clinical Physiological Nursing Seminar II (1-10, max. 20) Continuation of 541. Guided experience in selected situations in area of clinical interest. Minimum of seven hours of guided experience weekly. Prerequisite: 541.

NCLIN 552 Internship in Advanced Practice Nursing of Adults and Older Adults (8-9) Capstone clinical experience with opportunities to synthesize theoretical knowledge and clinical skills in care of adults and older adults. Planning, implementing, documenting, and evaluating therapeutic processes and outcomes under supervision of advanced practice clinical preceptor. Credit/no credit only. Prerequisites: NCLIN 501, 541, and 544, and PHARM 415.

NCLIN 553 Seminar in Primary Care I: Health Promotion (2) Weekly seminars with supervised field study within selected primary-care and wellness settings. Emphasis on health assessment and strategies

related to improving health in people of all ages. Analysis of, and counseling on, life-styles, nutrition, physical fitness, stress management, self-care, and prevention. Credit/no credit only. Prerequisites: graduate standing, permission of instructor.

NCLIN 556, 557 Seminar in Primary Care II, III: Management of Common Health Concerns (3, 3) Focus on research questions, patient presentations, and group discussions drawn from field study. Supervised clinical field study within selected primary health-care settings and weekly seminar discussions related to theory presented in NURS 510. Credit/no credit only. Prerequisite: graduate standing and permission of instructor.

NCLIN 558 Advanced Occupational Health Nursing (2-5) Occupational health nursing theory; concepts from community health nursing, industrial hygiene, occupational epidemiology, and toxicology. Students synthesize concepts and explore in-depth selected problems in work settings. Evaluation and application of theories and research findings. Field experiences in occupational health nursing mandatory for 5 credits. Prerequisites: ENV H 453, permission of instructor.

NCLIN 559 Seminar in Primary Care IV: Management of Common Health Concerns (3-5) Focus on research questions, patient presentations, and group discussions drawn from field study. Supervised clinical field study within selected primary care settings and weekly seminar discussions related to theory presented in NURS 510. Credit/no credit only. Prerequisite: permission of instructor; nurse practitioner students register for NURS 510 concurrently.

NCLIN 560 Seminar in Primary Care V: Complex Clinical Decision Making (1-11) Seminar with associated field study. Synthesis of advanced knowledge base and clinical family nurse practitioner skills with effective management of complex clinical problems. Credit/no credit only. Prerequisite: graduate standing and permission of instructor.

NCLIN 561 Individual Counseling (1) Analysis and application of principles for integrative and empirically-based counseling designing for a variety of specialized therapeutic situations and clients. Specific models addressed include motivational interviewing, adaptive counseling, problem-solving focused brief therapy, and crisis intervention and suicide prevention. Emphasis on systematic approaches for selecting effective interventions related to specific outcomes.

NCLIN 562 Self-Management Training (1) Emphasis on application of self-regulation theory, self-management training, and symptom management interventions. Intervention principles and skills addressed in teaching clients self-management include anger management strategies, techniques to promote relaxation response, imagery, biofeedback, cognitive restructuring, and mood modification strategies.

NCLIN 563 Biopharmacological Management in Psychosocial Nursing (1) Biological and pharmacological interventions pertinent to the practice of psychosocial nursing, including psychopharmacology, electroconvulsive therapy, and phototherapy. Emphasis on the empirical neuroendocrine bases and then nursing management issues pertaining to these interventions. Legal and ethical issues pertaining to

advanced practice and putative neurological mechanism are examined.

NCLIN 584 Program Planning and Evaluation (1) Application and analysis of selected methods for planning and evaluating health care programs and the delivery of services. Methods explored related to prevention, treatment and/or rehabilitation programs include needs assessment, development and design, and implementation and outcome evaluation of services for defined populations in the community.

NCLIN 565 Group and Family Psychoeducation Strategies (1) Emphasis on psychoeducational principles and skills used in implementation of intervention programs with client and family groups. Intervention issues addressed in applying life-skills training include motivating clients, facilitating life-skills acquisition, and fostering skills practice. Group work principles and strategies for developing a support group are also covered.

NCLIN 566 Advanced Clinical Practicum in Psychosocial Nursing (3-6, max. 12) Advanced clinical judgment emphasizing an inferential process proceeding from the observed to the conceptual. Students use theoretic knowledge base that provides multiple explanations for behaviors. Research applied to practice with selected clinical populations in varied psychosocial settings in concert with student's subspecialty interests. Credit/no credit only. Prerequisites: NURS 556, 559, 567.

NCLIN 567 Intervention Decision-Making in Psychosocial Nursing (1) Analysis of factors involved in intervention decision-making. Issues related to prevention, treatment, and rehabilitation include case management, partnership with clients in intervention decision-making, consultation and collaboration with other health care providers, making and receiving referrals, and management of coexisting disorders.

NCLIN 569 Practicum in Biopsychosocial Assessment (2/4) Practicum in either physical health assessment with opportunity to refine skills in taking health history and performing physical examinations or psychosocial assessment with opportunity to refine skills in psychosocial assessment interview, mental status examination, standardized clinical assessment instruments. Credit/no credit only. Concurrent enrollment in NCLIN 501 and/or NURS 549 required.

NCLIN 573 Advanced Field Study in Family Nursing (2-9) Advanced practice development in direct care, consultation, and/or care coordination with individual families or groups of families across the life span. Opportunities provided to strengthen interpersonal therapeutic process skills, family nursing approaches relevant to family health promotion, problematic family health patterns. Prerequisites: concurrent registration in NURS 572, 574. Recommended: NURS 571.

NCLIN 581 Seminar in Advanced Community Health Nursing (6) Construction and analysis of research questions, presentation of individual and community problems and intervention/evaluation strategies in community health nursing. Individual and community assessment and nursing strategies related to health promotion and prevention of illness. Field study in community health settings. Prerequisites: graduate standing and permission of instructor.

College of Ocean and Fishery Sciences

Dean

G. Ross Heath
557 Henderson

Associate Dean

Loveday L. Conquest

The marine environment has been a dominant factor in the history of the Pacific Northwest from the time of the first Indian settlements to the modern day of container ships and waterfront condominiums. It is not surprising, therefore, that the University has a long tradition of commitment to teaching, research, and public service in the marine and freshwater area.

The College of Ocean and Fishery Sciences, the newest college at the University, comprises five major units in the marine and freshwater sciences. Established in September 1981, the College consists of the Applied Physics Laboratory, and the Schools of Fisheries, Marine Affairs, and Oceanography. It also administers the Office of Marine Environmental and Resource Programs, which includes the Washington Sea Grant Program.

The College offers both undergraduate and graduate instructional programs; its faculty, staff, and students carry out research in oceans and freshwater lakes and rivers all over the world. Facilities range from oceangoing vessels to well-equipped laboratories and classrooms. A recent addition is the Marine Molecular Biotechnology Laboratory, jointly established in 1993 by the Schools of Fisheries and Oceanography. The Laboratory is well equipped for molecular biology teaching and research. Molecular techniques are now being used in a range of areas, including biosystematics, ecology, fisheries management, aquaculture, pathology, and food science.

Each of the units in the College focuses on a different aspect of the aquatic environment, but much overlap exists. Established in 1919, the School of Fisheries carries out research and teaching on the conservation, management, and utilization of living aquatic resources. It is concerned with marine, estuarine, and freshwater species and with understanding, protecting, and restoring their habitats. The School is also concerned with the biology and ecology of aquatic animals, with the management of free-ranging stocks, with the production of fish and shellfish through aquaculture, and with the safety and quality of the nation's seafood products. The School offers both undergraduate and graduate degrees.

Established in 1930, the School of Oceanography carries out research and teaching on the physical, chemical, and biological processes in the ocean and on the interactions of the ocean with the earth, the biosphere, and the atmosphere. It is concerned with the study of seawater in motion, life in the sea, the chemical composition and properties of seawater, the sediments and rocks beneath the sea, and the geophysics of the seafloor. It offers both undergraduate and graduate degrees.

Established in 1943, the Applied Physics Laboratory is a research and development unit with programs in ocean sciences, engineering, acoustic sensors, sound

propagation, marine and geophysical instrumentation, and polar science and technology. No degrees are offered, but special short courses and seminars are taught and graduate student support is available at research facilities.

Established in 1972, the School of Marine Affairs is interested in policy and institutional problems of the ocean. It combines natural sciences and engineering with law, economics, international affairs, and public administration. The School's teaching and research programs include marine affairs, coastal zone management, ports and marine transportation, atmospheric and marine policy, living marine resources, and international law of the sea. The Master of Marine Affairs degree is offered.

Also part of the College is the Office of Marine Environmental and Resource Programs (OMERP), which manages the Washington Sea Grant Program and related activities. The Washington Sea Grant Program was established by Congress in 1969 to enhance the conservation and use of the nation's marine resources through coordinated efforts in education, training, research, development, and outreach, and technology transfer. Although the Sea Grant program does not offer degrees, it presents workshops, short courses, lectures, and publications, and supports extensive research and outreach activities. A number of state and federal initiatives are also managed by OMERP.

One of the major achievements in this area was the designation of the University in 1971 by the U.S. Secretary of Commerce as a Sea Grant College. Along with the University of Rhode Island, Texas A&M University, and Oregon State University, the University of Washington was one of the first four universities so designated in recognition of outstanding sustained programs in research, education, and advisory services in the marine area.

In 1996, the College had a total of 200 undergraduate and 250 graduate students enrolled, a faculty of 198 members, and a total budget of \$60 million, making it one of the largest institutions of its kind in the nation.

Office of Student Development

Through the Office of Student Development, the College of Ocean and Fishery Sciences offers learning experiences to complement traditional course work.

Students develop transferable skills through workshops in career development, internships, and part-time work to bridge the transition from classroom and laboratory to employment after graduation.

Additional services include Northwest Water Work, a semi-monthly summary of current employment and internships in water-related areas; World Link, an online résumé listing service available on the World Wide Web; an annual Career Fair in February; and a Career Center providing video tapes and printed material about organizations, career planning, and employment opportunities related to marine and freshwater sciences.

Additional information may be obtained from Pat Caver, Director, Office of Student Development, 561 Henderson.

Fisheries

204 Fisheries Center

The School of Fisheries, which was established in 1919, offers courses and conducts research on the conservation, management, and effective use of fish and shellfish resources. Education and research in the School include studies of aquatic ecology; population dynamics; management of free-ranging stocks; hatch-

ery-based propagation of marine and freshwater organisms; seafood products; effects of human activities on aquatic/marine ecosystems. Faculty and students in the School draw upon the disciplines of zoology, biology, botany, statistics, chemistry, physics, and mathematics to conduct basic and applied research in the field of fishery science. Joint programs are maintained with the College of Forest Resources, the School of Marine Affairs, the School of Oceanography, the School of Medicine, and the departments of Zoology, Genetics, Pathology, Biostatistics, Applied Mathematics, Civil Engineering, Environmental Health, and Nutritional Sciences.

Courses

A full spectrum of undergraduate- and graduate-level courses allows students to learn basic principles of fishery science and to develop expertise in specialized fields such as quantitative fishery management, public and private aquaculture, seafood technology, and aquatic ecology. Among the wide variety of courses open to students are the following: ichthyology, world fisheries and aquaculture, salmonid behavior and life history, fisheries stock assessment, ecology of marine fishes, genetics in fish management and production, physiological effects of water pollutants, and food engineering.

Summer quarter instruction is offered both on the main campus and at the Friday Harbor Laboratories on San Juan Island.

Advising

The Office of Instructional Support and Undergraduate Advising is located in 213 Fisheries Center. Graduate Student Services is located in 217 Fisheries Center. Students can receive assistance from the office staff with curriculum, course scheduling, and graduation requirements. Faculty mentors are also available to all students.

Interdisciplinary Programs

Center for Quantitative Science in Forestry, Fisheries, and Wildlife: The Center is an intercollege academic unit sponsored by the College of Forest Resources and the School of Fisheries. The Center offers a comprehensive program of study in mathematics and statistical methods applied to problems in ecology and natural resources management. The faculty of the Center are drawn from the College of Forest Resources or the School of Fisheries, and most hold adjunct appointments in the Department of Biostatistics.

Joint Curriculum in Fishery Management: The School of Fisheries and the School of Marine Affairs offer a joint curriculum in fishery management, consisting of parallel two-year master's programs. The curriculum is designed to provide professional fisheries managers with the skills needed to participate effectively in contemporary fishery management. These skills require a multidisciplinary education in biology, economics, quantitative methods, law, policy analysis, and political science. Students may enter the fisheries management master's program through either the School of Fisheries or the School of Marine Affairs and must meet the thesis and other requirements of their School.

Research

The faculty, staff, and students of the School conduct basic and applied research on regional, national, and international fishery problems. Examples of research projects include the following:

In the field of fisheries management—development of strategies for enhancing inland recreational fishing, reduction of bycatch discards in the North Pacific through improvements in fishing gear design, influence of physical oceanographic factors on recruitment of larval fish and shellfish. *In the field of aquaculture*—identification of hormone receptors involved in reproduction and smoltification, development of DNA probes for rapid identification of pathogens, manipulation of chromosome complement to select for desirable

traits in cultured fish and shellfish. *In the fields of evolutionary biology and ecology*—application of molecular biotechnology to the study of taxonomy, behavioral studies of homing and straying in Pacific salmon, analysis of energy flow in Pacific Northwest estuaries. *In the field of habitat protection*—contaminant transport through aquatic food chains, effects of forest practices on fish habitat, development of mitigation measures for restoring damaged wetlands. *In the field of resource utilization*—determination of fat content in edible fish tissue using non-invasive technology, development of techniques for tracing sources of contamination in shellfish beds, techniques to enhance the nutritional value of seafood products.

Researchers in the School collaborate with scientists within the University and with investigators employed by other agencies. The School benefits from the presence in Seattle of laboratories of the National Marine Fisheries Service, the National Biological Service, and the Washington State Department of Fish and Wildlife. The headquarters and research staff of the International Pacific Halibut Commission are located on the campus as well. In addition, researchers collaborate with the scientific staff of private companies located in the Puget Sound region and elsewhere. School of Fisheries researchers frequently participate in inter-institutional projects that involve scientists from other states and from other countries.

The research program is enhanced through the activities of several institutes and centers that are housed within the School.

The *Fisheries Research Institute* coordinates research throughout the School. Long-term projects include research on the origins, abundance, migratory patterns, and ocean distribution of Pacific salmon and steelhead trout; spawning distribution, growth, and abundance of sockeye salmon in Alaska's Bristol Bay; environmental (physical and biological) factors influencing salmonid productivity.

The *Institute for Food Science and Technology* conducts research on seafood composition, quality, safety, processing and utilization, nutrition, and related food science topics.

The *Washington Cooperative Fish and Wildlife Research Unit* is supported by the U.S. Department of Interior through the National Biological Service, the Wildlife Management Institute, and by the Washington State Departments of Ecology, Natural Resources, and Fish and Wildlife. The Unit conducts research related to management and conservation of fisheries and wildlife.

The *Center for Streamside Studies* is an interdisciplinary unit of the College of Forest Resources and the School of Fisheries. The Center conducts research related to management issues that surround the production and protection of forest, fish, wildlife, and water resources associated with streams and rivers in the Pacific Northwest.

The *Western Regional Aquaculture Center* is one of five regional aquaculture centers supported by the U.S. Department of Agriculture. Participating scientists from twelve Western states conduct research that is directed toward enhancement of commercial aquaculture production.

The *Olympic Natural Resources Center* is an interdisciplinary research and educational program related to the marine and forest resources of the Olympic Peninsula.

Facilities and Services

The Fisheries Center, the Fisheries Teaching and Research Building, and the Marine Studies Building are located adjacent to the Lake Washington Ship Canal. The buildings contain classrooms, laboratories, and support facilities. The Fisheries-Oceanography Library, a branch library offering research materials in fisheries, food science, oceanography, and wildlife

science, is located in the Oceanography Teaching Building nearby. The collections of fishes and invertebrates now total some 230,000 specimens, representing more than 3,700 species in 310 families.

An annual run of several thousand salmon has been developed and is maintained at the School by the release of thousands of fingerlings each spring. Returning adults utilize a fish ladder to enter the School's experimental fish hatchery. The run is the basis for both instruction and research on the life cycle of Pacific salmon. A secondary hatchery at Seward Park allows for additional projects, such as a newly developing sportfish propagation program.

The Marine Molecular Biotechnology Laboratory is jointly operated by the Schools of Fisheries and Oceanography. State of the art equipment is available for automatic sequencing of DNA as well as other techniques.

Other laboratories provide for the study of the physiology, biochemistry, and behavior of fish and of the effects of pollutants on fish. Physiological facilities include equipment for surgical procedures and biochemical analysis of body fluids and tissues from both freshwater and marine fish.

There are four clusters of computers (two Sun-based UNIX clusters, one PC, and one Macintosh cluster) available for use by students, faculty, and staff. Two of the clusters are used for classroom instruction. Network access to the Internet for email and the World Wide Web, word processing, spreadsheet, math and statistical applications, and a Publications Office with expertise in graphics are all available within the School. Additionally, an extensive set of applications is provided through University Computing Services, which is directly accessible from the Fisheries computers.

The School uses various small vessels for instructional and research work, including tow netting, purse seining, and trawling. These vessels are used in regular courses or training cruises to introduce students to shipboard operations.

Fisheries field stations in Alaska and at Big Beef Creek on Hood Canal provide additional opportunities for field studies and research in stream and estuarine ecology.

Seafood research facilities, located in the Marine Studies Building, include well-equipped laboratories for microbiology, biochemistry, and chemical analysis. The seafood-processing and seafood-engineering laboratory pilot plant complex comprises several facilities containing equipment for teaching and experimental work in applied areas of unit operations and processing.

Student Organizations

There are several student organizations within the School that provide extracurricular social and educational activities and that serve as a liaison between students and faculty: Fish Club (formed in 1922, includes graduate and undergraduate students), Bass Club (undergraduates), and FINS (Fisheries Interdisciplinary Network of Students, a graduate student council). There is also a Food Science Club that promotes interest in food science and seafood technology; the club works closely with the Puget Sound section of the Institute of Food Technologists.

Financial Aid

The School offers limited financial assistance to undergraduates and graduates through scholarships. The *Handbook of Scholarships*, available from the Office of Student Financial Aid, 105 Schmitz, lists other available scholarships.

Employment

The College of Ocean and Fishery Sciences' Office of Student Development maintains a file of permanent and temporary job opportunities for its students. Both

summer and part-time employment during the scholastic year are frequently available with the research organizations that are associated with the School on or near the campus and elsewhere in the Pacific Northwest. The Fisheries Research Institute normally hires some students for summer work in the field and usually has several part-time positions available during the school year.

Students receiving degrees in fisheries find employment in varied fields. Some graduates pursue careers in resource management agencies such as the National Marine Fisheries Service, the U.S. Fish and Wildlife Service, the Northwest Indian Fish Commission, and state departments of fisheries or wildlife. Some work for enforcement agencies such as the U.S. Environmental Protection Agency, the U.S. Food and Drug Administration, or state or local departments of environmental quality. Many graduates find employment in the private sector, working for aquaculture companies, the seafood industry, the recreational fishing industry, and environmental consulting firms. Employment in international projects is available through organizations such as the Peace Corps, the United Nations Food and Agriculture Organization, the Agency for International Development, the World Bank, and private industry. Positions in academic institutions are open to students completing advanced degree programs.

Undergraduate Program

The School offers the Bachelor of Science in Fisheries degree.

High School Preparation

Students are urged to take four years of college preparatory mathematics (usually including precalculus or mathematical analysis), because these are prerequisites for the mathematics courses included in all School curricula. Taking high school courses in chemistry, physics, and biology and training in computer use will prove to be valuable to the fisheries student.

Admission as a Fisheries Major

Students who wish to major in fisheries must be students in good standing in the University and must declare a major following University-wide guidelines.

After notification of admission and before registration, new students should visit or write to the School for help in planning their course programs and to be assigned a faculty mentor. Academic and other counseling of fisheries students is provided through the Office of Student Services.

Bachelor of Science in Fisheries

The baccalaureate degree requires completion of a core curriculum and no fewer than 40 credits in fisheries. The program includes the subjects listed below or their equivalents. Each student must meet the general University requirements for graduation.

The Natural World: (minimum of 46 credits) General Biology—BIOL 201 (5), 202 (5), 203 (5) or BIOL 101-102, GENET 371 (5-5, 5). Inorganic Chemistry—CHEM 140 (4), 141 (1), 150 (4), 160 (4). Organic Chemistry—CHEM 220 (5) or CHEM 223 (4) and 224 (4). General Physics—PHYS 114 (4), 115 (4). Oceanography—OCEAN 200 (3). Ecology—BIOL 472 (4).

Mathematics and Statistics: (minimum of 13 credits beyond MATH 120) Mathematics—Q SCI 291 (4), 292 (4) or MATH 124 (5), 125 (5). Statistics—Q SCI 381 (5).

Individuals & Societies and Visual, Literary, & Performing Arts: Minimum 10 credits in each area.

Writing Proficiency: (minimum of 12 credits) 5 credits of composition drawn from the University list, and at least 7 additional credits of writing-intensive courses.

Fishery Sciences: (30 credits required courses, FISH 210 (5), 310 (5), 311 (5), 312 (4), 323 (3), 324 (4), 325 (4), plus a minimum of three courses totaling at least 12 credits in 400-level fisheries courses, and 3 credits in FISH 495.

Additional elective courses should be taken to bring the total to 180 credits. Assistance in selection of elective courses can be obtained from the undergraduate adviser in the School. Students wishing to specialize in ecology and evolution, aquaculture, seafood science, wildlife biology, or fisheries management and conservation may obtain flyers listing recommended courses in 213 Fisheries Center.

Minors

Minor Requirements—Fisheries Science: Minimum of 27-28 credits to include FISH 310 (5 credits) or 311 (5); FISH 312 (4); FISH 323 (3) or 324 (4) or 325 (4); Q SCI 381 (5) or 482 (5); a minimum of two 400-level fisheries courses totaling at least 8 credits.

Minor Requirements—Food Science/Seafood Science: Minimum 31 credits to include FISH 324 (4 credits), 452 (4), 470 (5), 480 (5), 490 (5); ENVH 441 (3); MICROM 301 (3), 302 (2).

Graduate Program

The School offers programs leading to the Master of Science and Doctor of Philosophy degrees.

Admission Requirements

Minimum requirements for admission to the graduate program in the School are a bachelor's degree from an institution of recognized standing, a GPA of 3.00 in the last two years of college work and approval of the School and the Graduate School. Students enter the School from varied disciplines at many universities. All have in common a strong background in the sciences and mathematics. Previous training in fisheries is not required.

Applicants for the graduate program must submit a completed application form and description of their interests and objectives, GRE scores (general portion only is required), transcripts of all previous college course work, three letters of recommendation, and a TOEFL score (only for applicants who are non-native English speakers). Applications must be submitted prior to January 31. Admissions are limited to autumn quarter. Final acceptance is contingent on matching each incoming student with a faculty member having space and similar research interests. Applicants may contact the School of Fisheries Student Services Office for complete application materials, including a list of faculty and their research interests.

Master of Science

Any graduate student without a previous master's degree from a recognized school is expected to start at the master's degree level. At least one year of study, with completion of a thesis project, leads to the Master of Science degree. A minimum of 45 senior or graduate credits must be earned including 18 credits of thesis research. Students must take 17 credit hours of specified courses (the graduate core curriculum). A seminar on the results of the thesis research and an oral defense of the thesis are required for graduation. There is no foreign language requirement for the master's degree. Further details can be obtained from the Student Services Office.

Doctor of Philosophy

The student must complete at least three years of graduate study and complete a dissertation to earn the Ph.D. Certain credits earned in conjunction with a master's degree program may be applied toward the doctoral program. The same graduate core curriculum as required for the master's degree must be completed unless the student has already taken these same

courses at the School of Fisheries or their equivalent. One academic year of foreign language with passing grades or equivalent competency is required. Students must pass written and oral General Examinations during their second year of residency. Presentation and defense of a dissertation proposal is normally a part of the oral examination. Further details can be obtained from the Student Services Office.

Financial Aid

General information on graduate student support is available from the Office of Student Financial Aid, 105 Schmitz. Scholarships, fellowships, and teaching and research assistantships are available from a wide variety of sources for qualified graduate students. Most student support comes from research grants and contracts under the direction of individual professors. Graduate applicants are, therefore, urged to discuss their financial needs with professors in their potential major fields and with the graduate program coordinator during the early stages of the graduate application process.

Correspondence and Information

A package of materials describing courses, listing more specific procedures for applying for graduate admission, and giving details of faculty research and activities is available from the Program Assistant, 217 Fisheries Center, Box 357980; (206) 543-5893.

Faculty

Director

Marsha L. Landolt

Professors

Alverson, Dayton L. * 1980, (Affiliate); PhD, 1967, University of Washington; marine affairs.

Armstrong, David A. * 1978; MS, 1974, Oregon State University; PhD, 1978, University of California (Davis); shellfish physiology.

Bare, B. Bruce * 1969, (Adjunct); MS, 1965, University of Minnesota; PhD, 1969, Purdue University; harvest scheduling, biometry, forest land management, taxation, finance, management science.

Beil, Milo C. 1953, (Emeritus); BS, 1930, University of Washington; hydrology and fish guidance.

Bevan, Donald E. * 1947, (Emeritus); PhD, 1959, University of Washington; biometrics, salmon and the Columbia River.

Brown, George W. * 1967, (Emeritus); PhD, 1955, University of California (Berkeley); fish biochemistry and biochemical ecology.

Burgner, Robert L. * 1949, (Emeritus); PhD, 1958, University of Washington; salmon ecology and salmon biology.

Chew, Kenneth K. * 1962; PhD, 1962, University of Washington; shellfish biology and aquaculture.

Dickhoff, Walton W. * 1975; PhD, 1976, University of California (Berkeley); fish physiology, endocrinology, aquaculture.

Donaldson, Lauren R. 1932, (Emeritus); PhD, 1939, University of Washington; freshwater fish biology.

Ford, E. David * 1985; PhD, 1968, University College, London (UK); forest ecology and ecophysiology, modeling, spatial statistics.

Francis, Robert C. * 1983; PhD, 1970, University of Washington; fishery oceanography, effects of climate on marine ecosystems, paleoecology, fisheries management.

Gallucci, Vincent * 1976; PhD, 1971, North Carolina State University; biomathematics and population dynamics.

Gunderson, Donald R. * 1978; PhD, 1976, University of Washington; marine fisheries and stock assessment.

Halver, John E. * 1949, (Emeritus); PhD, 1953, University of Washington; nutrition, biochemistry, toxicology.

Hershberger, William K. * 1978; PhD, 1968, Pennsylvania State University; fish genetics.

Hilborn, Ray * 1987; PhD, 1974, University of British Columbia (Canada); population dynamics and resource policy.

Karr, James * 1991, (Adjunct); PhD, 1970, University of Illinois; ecology and conservation biology, water resources, environmental sciences, natural resources.

Kocan, Richard M. * 1978; PhD, 1967, Michigan State University; aquatic toxicology, fish and wildlife diseases.

Landolt, Marsha L. * 1975; PhD, 1976, George Washington University; fish and shellfish disease.

Liston, John * 1957, (Emeritus); PhD, 1955, University of Aberdeen (UK); food science, marine microbiology.

Mathews, Stephen B. * 1972; PhD, 1967, University of Washington; quantitative fishery management.

Miller, Bruce S. * 1971; PhD, 1969, University of Washington; life history and ecology of marine fishes, especially early life history.

Miller, Marc * 1979, (Adjunct); PhD, 1974, University of California (Irvine); maritime anthropology, cognitive anthropology and social/cultural change.

Nakatani, Roy E. * 1970, (Emeritus); PhD, 1960, University of Washington; water pollution, ecology.

Pietsch, Theodore W. * 1978; PhD, 1973, University of Southern California; ichthyology.

Pigott, George M. * 1965; PhD, 1963, University of Washington; food engineering.

Plisetskaya, Erika * 1980, (Emeritus); PhD, 1958, DSc, 1973, Academy of Sciences (USSR).

Rogers, Donald E. * 1959, (Research); PhD, 1967, University of Washington; sockeye salmon research.

Royce, William F. 1983, (Emeritus); PhD, 1943, Cornell University; applications of fisheries science.

Seymour, Ailyn H. 1945, (Emeritus); PhD, 1956, University of Washington; radioecology.

Skalski, John R. * 1987; PhD, 1985, Cornell University; environmental sampling and effects assessment on wild populations, parameter estimation.

Stickney, Robert R. * 1985, (Affiliate); PhD, 1971, Florida State University.

Swartzman, Gordon Leni * 1973, (Research); PhD, 1969, University of Michigan.

Taub, Frieda B. * 1961; PhD, 1959, Rutgers University; aquatic ecology, ecotoxicology, ecological risk assessment, harmful algae, closed ecological systems.

Wissmar, Robert C. * 1972; PhD, 1972, University of Idaho; ecology.

Wooster, Warren S. * 1976, (Emeritus); PhD, 1953, University of California (San Diego); effects of climate change on marine ecosystems, use of scientific information in marine management.

Associate Professors

Anderson, James J. * 1969; PhD, 1977, University of Washington; fisheries and oceanography.

Conquest, Loveday L. * 1988; PhD, 1975, University of Washington; statistics in forestry, fisheries, and environmental pollution monitoring.

Dong, Faye M. * 1982; PhD, 1976, University of California (Davis); fish nutrition, seafood quality.

Grue, Christian E. * 1989; PhD, 1977, Texas A&M University; wildlife toxicology, wildlife and fisheries science.

Huppert, Daniel D. * 1987, (Adjunct); PhD, 1975, University of Washington; economics and management of natural resources, especially marine fisheries.

Leschine, Thomas M. * 1983, (Adjunct); PhD, 1975, University of Pittsburgh; marine pollution management, ocean policy studies.

Nevissi, Ahmad * 1973, (Adjunct Research); MS, 1966, University of Hannover (Germany); PhD, 1973, University of Arkansas; radiochemistry.

Pauley, Gilbert B. * 1974; PhD, 1971, University of California (Irvine); fish immunology, recreational fisheries.

Pikitch, Ellen * 1987; PhD, 1983, Indiana University; marine fisheries population dynamics, assessment and management.

Quinn, Thomas P. * 1986; PhD, 1981, University of Washington; fish ecology, evolution and behavior.

Rasco, Barbara A. * 1984; PhD, 1983, University of Massachusetts; JD, 1995, Seattle University; food chemistry, fisheries technology, aquaculture, food safety, food law, products liability.

Sibley, Thomas H. * 1978; PhD, 1976, University of California (Davis); freshwater ecology.

Van Blaricom, Glenn R. * 1993; PhD, 1978, University of California (San Diego); aquatic wildlife, ecology of marine communities, wildlife-fisheries interactions.

Assistant Professors

Bentzen, Paul * 1993; PhD, 1989, McGill University (Canada); molecular population/evolution genetics of fishes and other aquatic organisms.

Foote, Christopher * 1992; PhD, 1988, University of British Columbia (Canada); behavioral ecology, population genetics and evolutionary biology of fishes.

Herwig, Russell P. * 1991, (Research); PhD, 1989, University of Washington; environmental microbiology, bioremediation, molecular microbial ecology, microbial phylogenetics.

Senior Lecturer

Johnson, Frederick G. 1987; MA, 1973, Stanford University; PhD, 1979, University of Washington; marine biology, environmental impact.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Food Science

Courses for Undergraduates

FD SC 300 Nutrition for Today (3) NW Basic and applied nutrition and food science. Identification and physiological roles of nutrients, nutritional requirements, problems with over- and undernutrition, and nutritional and food-related diseases. Food additives, processing, safety, and their effects on overall nutrition. Current issues of public significance. Offered: jointly with NUTR 300.

FD SC 350 Safety of our Food Supply (3) NW Rasco Current topics surrounding the safety of our food supply, including nutritional, microbiological, chemical, and regulatory issues. Offered: jointly with FISH 350.

Courses for Graduates Only

FD SC 521 Graduate Seminar in Food Science (1, max. 3) Lectures and discussions of current problems and current research in food science. Offered on credit/no credit basis only. Prerequisite: permission of instructor.

FD SC 524 Microorganisms in Foods (3) Occurrence and activity of microorganisms important in

foods as agents of spoilage, fermentation, and food-borne disease; relationship to food or food process; control and detection. Food science majors must take 534 concurrently with 524. Prerequisite: graduate standing in food science or permission of instructor.

FD SC 525 Advanced Food Engineering (3) Pigott Application of modern engineering principles to operations such as evaporation, drying, distillation, pumping, and heat transfer in the handling, processing, and packaging of foods. To be taken concurrently with 526. Prerequisite: FISH 470 or permission of instructor.

FD SC 526 Advanced Food Engineering Laboratory (3) Pigott Laboratory investigations concerned with the engineering of food processes and processing facilities. To be taken concurrently with 525. Laboratory fee may be required.

FD SC 534 Microorganisms in Foods Laboratory (1) Special projects or selected experiments designed to study microorganisms in foods. Food science majors must take 534 concurrently with 524. Laboratory fee may be required.

FD SC 600 Independent Study or Research (*) **FD SC 700 Master's Thesis (*)**

Fisheries

Courses for Undergraduates

FISH 100 Introduction to Careers in the Marine Sciences (1) Conquest, Caver Presentations by various faculty and staff members, students and recent graduates offer an introduction to the College of Ocean and Fishery Sciences, curricular options, and professional opportunities in the marine sciences. Credit/no credit only. Limited to freshmen, sophomores or transfer juniors. Offered: jointly with OCEAN 100; Sp.

FISH 101 Introduction to Fisheries Science (5) NW Johnson Identification, distribution, and life histories of selected fish and shellfish; commercial and recreational fishing; utilization of fisheries products; problems faced in fisheries conservation and management. Offered: WSpS.

FISH 210 Fisheries Techniques (5) NW Theory and techniques of field research in fisheries; practical sampling design, collection, and interpretation of data from river, lake, and marine environments. Field trips and laboratory demonstrations. Offered: ASP.

FISH 310 Biology of Shellfish (5) NW Armstrong Commercially important mollusks, crustaceans, and other harvested invertebrates highlighted with respect to systematics, anatomy, reproductive strategies, feeding, and growth. Examples of species that demonstrate variability in recruitment and complex life cycles. Laboratories, field trips. Prerequisite: 10 biology/zoology credits. Offered: A.

FISH 311 Biology of Fishes (5) NW Foote, Pietsch Lecture, laboratory, and field study of the morphological, physiological, behavioral, and ecological diversity of fishes of the world; designed to provide a basic foundation for advanced courses in all areas of finfish fisheries. Prerequisite: 10 credits in biological sciences. Offered: AW.

FISH 312 Fisheries Ecology (4) NW Miller, Taub, Quinn Ecological characteristics of fishes and shellfishes in the important freshwater and marine habitats of North America. Relationship between physical aspects of the habitats and community structure. Impacts of human activities on diversity and abundance. Prerequisites: 310, 311 and OCEAN 200. Offered: ASP.

FISH 323 Fisheries Management and Conservation (3) NW Gunderson Importance of aquatic living resources; current world fisheries and their future, biological principles of fisheries conservation and

management; development and implementation of fisheries policy; case histories of successful and unsuccessful fishery management systems. Offered: A.

FISH 324 Utilization of Fishery Commodities (4) NW Dong, Rasco Overview of factors affecting food quality of finfish and shellfish; chemical/physical properties of aquatic food products; microbiological/parasitological environmental forces affecting food safety; by-product utilization; effects of processing on quality; regulatory aspects; future of aquatic food products. Prerequisites: CHEM 223 and 224. Recommended: microbiology. Offered: W.

FISH 325 Introduction to Aquaculture (4) NW Survey of fish and shellfish species involved in commercial and enhancement aquaculture. History of aquaculture and current world production levels are examined. Emphasis on design and operation of aquaculture facilities, water quality and management, nutrition and diseases of fish and shellfish, harvesting, marketing, economics. Visits to aquaculture and related facilities. Offered: ASP.

FISH 328 Forestry-Fisheries Interactions (4) NW Bolton Characteristics of forestry-fisheries interactions in terrestrial and aquatic landscapes. Effects of changes in landforms on forest and aquatic communities. River basin and watershed features. Forest stand dynamics, forest hydrology, fish and wildlife histories and behavior. Resource conflicts and resolution. Recommended: general biology and ecology. Offered: jointly with F M 328; W.

FISH 350 Safety of our Food Supply (3) NW Rasco Current topics surrounding the safety of our food supply, including nutritional, microbiological, chemical, and regulatory issues. Offered: jointly with FD SC 350.

FISH 367 Recreational Fisheries (4) NW Pauley History of recreational fishing; present trends in sport fishing and prediction of future trends; types and characteristics of recreational fisheries; value of recreational fisheries; habitat requirements; ecology and behavior that are important considerations in management; management philosophy and techniques. Recommended for majors and nonmajors. Field trips. Laboratory fee may be required. Prerequisite: 10 credits in biological sciences. Offered: even years.

FISH 401 Systematics, Zoogeography, and Evolution of Fishes (5) NW Pietsch Advanced course in ichthyology with emphasis on living bony fishes of the world; past and present biodiversity, evolutionary history, classification, comparative morphology, geographic distribution, and historical zoogeography. Prerequisites: 10 credits in biological sciences. Offered: Sp.

FISH 404 Diseases of Aquatic Animals (5) Landolt Overview of communicable and noncommunicable diseases that affect fish and shellfish. Major pathogens of free-ranging as well as captive animals discussed. Students learn to recognize, prevent, and control economically and ecologically important disease syndromes. Prerequisite: upper division standing. Offered: W.

FISH 405 Molluscan Aquaculture and Fisheries (5) NW Chew Biology, ecology, management, and economic importance of oysters, clams, scallops, mussels, abalones, cephalopods, and other mollusks. Emphasis on techniques for production through aquaculture as well as harvest strategies for wild stocks. Field trips. Prerequisite: 10 credits in biological sciences. Offered: Sp.

FISH 406 Crustacean Fisheries and Aquaculture (5) NW Armstrong, Chew Biology, ecology, management, and economic importance of shellfish, emphasizing crustaceans. Wild populations and aquaculture production of important phyla discussed. Field trips. Prerequisite: 10 credits in biological science. Offered: W.

FISH 415 Physiology of Aquatic Animals (5) NW *Dickhoff* Types, occurrences, and roles of inorganic and organic substances in supporting physiological functions, including osmoregulation, respiration, circulation, bioenergetics, digestion, and musculo-skeletal systems. Shows the integration of these processes, including stress and reproductive responses, by neuroendocrine systems. Prerequisites: 10 credits in biological sciences, one course in organic chemistry. Offered: odd years, W.

FISH 425 Life History of Marine Fishes (9) NW *Miller* Early life history, including modes of reproduction, spawning, fecundity, egg and larva development, and sampling and ecology of eggs and larvae; aging, food habits, subpopulation identification, and migrations of marine fishes. Prerequisite: 311 or permission of instructor. Offered: Friday Harbor Laboratories even years, Sp.

FISH 430 Biological Problems in Water Pollution (3/5) NW *Taub* Ecological risk assessment of toxic chemicals and problems associated with electrical power production. Considers safety and toxicity and effects on individuals, populations, and communities. Laboratory covers simulation models of chemical exposure and community effects. Prerequisite: senior or graduate standing in fisheries, engineering, or related field. Offered: jointly with CIVE 461; W.

FISH 434 Ecological Effects of Waste Water (3/5) NW *Welch* Principles of aquatic ecology that relate to causes and effects of water quality problems in lakes and streams. Population growth kinetics, nutrient cycling, eutrophication; acidification, oxygen/temperature requirements, and effects of various wastes on aquatic animals. Prerequisite: senior or graduate standing in engineering or science. Offered: jointly with CIVE 462; A.

FISH 444 Fisheries Genetics (4) NW *Bentzen, Hershberger* Concepts in management and culture of aquatic species. Cytogenetic analysis, manipulation of chromosomes, electrophoretic analysis, genetic analysis of natural and cultured populations, quantitative genetic analysis, and effects of selection and breeding programs. Laboratory experience with analytical techniques. Prerequisites: FISH 311 and GENET 360 or 365 and permission of instructor. Offered: W.

FISH 450 Salmonid Behavior and Life History (4) NW *Quinn* Marine distribution, homing migration, and spawning behavior of adult salmon: incubation, emergence, migration, and residence of fry; fingerling distribution and residence with reference to species interaction and population evolution. Prerequisites: 311 and 15 credits in biological sciences. Offered: A.

FISH 451 Reproduction and Early Development in Fish (4) NW *Hershberger* Reproductive development, sexual maturation, spawning and incubation in selected fish species; embryology and developmental traits of different salmonid and non-salmonid species; practical experience in artificial spawning techniques, egg handling and care, incubation techniques and the handling of newly-hatched alevins. Offered: A.

FISH 452 Fish and Shellfish Nutrition (5) NW *Dong* Basic nutritional requirements and interactions of finfish and shellfish in nature and artificial environments. Feed ingredient classification, processing, and nutrient profiles. Fish feed formulation techniques. Experimental design and completion of laboratory nutritional study. Prerequisites: 311 and 10 credits in biological sciences. Offered: Sp.

FISH 454 Aquatic Wildlife Ecology (3) NW *VanBlaricom* Conceptual examination of relationships of aquatic wildlife populations (mammals, birds, reptiles, amphibians) to one another and to the aquatic realm. Application of conceptual background to contemporary high-profile issues in aquatic wildlife ecology, conservation, and management. Included is exposure to primary technical literature in the field. Offered: jointly with ESC 454; even years, Sp.

FISH 456 Fundamentals of Fish Population Dynamics and Management (4) NW *Pikitch* Conveys fundamental concepts of fish population dynamics and fishery management within context of real-world fisheries problems. Lectures discuss notation, terminology, mathematical models, fisheries principles, and case studies. Laboratory time devoted to practical applications, problems. Prerequisites: Q SCI 291 and 292 or MATH 124 and 125 or equivalent. Offered: jointly with Q SCI 456; A.

FISH 457 Methods of Abundance Estimation (4) NW *Gallucci, Gunderson* Methods of estimating fish abundance by direct sampling and indirectly from tagging, catch, and effort analysis. Confidence limits and bias adjustments. Design of marine fishery surveys using statistical sampling principles. Laboratory work with real fishery data and data collected during trawl sampling survey. Prerequisites: Q SCI 291, 292, 381, and 456 or equivalent. Offered: jointly with Q SCI 457; W.

FISH 458 Fisheries Stock Assessment (4) NW *Hilborn* Emphasizes quantitative analysis of fisheries data to determine how the fishery would respond to alternative management actions. Major topics include production models, stock and recruitment, catch at age analysis, and formulation of harvest strategies. Prerequisite: 456 or permission of instructor. Offered: jointly with Q SCI 458; Sp.

FISH 470 Aquatic Food Engineering (5) NW *Pigott* Quantitative physics/chemistry of harvesting, processing, storing, packaging, and marketing aquatic foods. Solving problems of mass and energy transfer with regard to processes and to changes in important food components. Use of computer process control involving basic food engineering principles. Prerequisites: MATH 125, PHYS 115, and CHEM 160 or permission. Offered: W.

FISH 475 Marine Mammalogy (3) NW *Van Blaricom* Evolution, taxonomy, physiology, life history, and behavior of marine mammals; the techniques of studying and the management and conservation of them. Offered: odd years; Sp.

FISH 476 Laboratory of Marine Mammalogy (2) NW *Van Blaricom* Evolution, taxonomy, physiology, life history, and behavior of marine mammals; the techniques of studying and the management and conservation of them. Laboratory fee may be required. To be taken concurrently with 475. Prerequisite: 15 credits in biological sciences. Recommended: vertebrate anatomy and physiology. Offered: odd years; Sp.

FISH 480 Chemical and Analytical Methods in Fisheries (5) NW *Rasco* Chemical composition, structure, properties, and chemical changes of fishery and other food products. Principles of separation and identification of food components by chromatographic, spectroscopic, and immunochemical methods. Prerequisites: 324 and CHEM 224 or equivalent; Sp.

FISH 490 Aquatic Food Microbiology (5) NW Occurrence and activity of microorganisms in aquatic foods, their significance in spoilage, fermentation, deterioration, foodborne disease, and nutritional effects. Principles of control and destruction by environmental adjustment and processing, detection, and evaluation of significance. Prerequisites: 324, MICROM 301 and 302 or equivalent, and CHEM 224; A.

FISH 495 Senior Project (3) Self-directed research project. Applied or basic research in an area relating to fisheries science. Offered: AWSpS.

FISH 497 Special Topics in Fisheries (1-5) One-time offerings of topics in fisheries by resident or visiting faculty.

FISH 498 Internship/Experiential Learning (1-9) NW Structured, practical training in the fishing industry, government agencies and other areas utilizing fisheries, food science, or quantitative science exper-

tise. Experiences are supervised and evaluated. Written reports required. Prerequisite: permission of faculty adviser. Offered: AWSpS.

FISH 499 Undergraduate Research (1-5, max. 9) NW Individual research within the School of Fisheries. Each project supervised by an individual faculty member. Written reports required. Prerequisite: permission of instructor. Offered: AWSpS.

Courses for Graduates Only

FISH 501 Internship/Experiential Learning (1-9) Structured, practical training in the fishing industry, government agencies and other areas utilizing fisheries, food science, or quantitative science expertise. Experiences are supervised and evaluated. Written reports required. Prerequisite: permission of faculty adviser.

FISH 502 Fundamentals of Fishery Science (5) *Dong, Francis* Team-taught course designed to provide an advanced overview of all aspects of fishery science. Emphasis on critical concepts of fishery biology relevant to those requiring a basic understanding of major sub-disciplines of the field. Theoretical approach emphasized. Extensive use of classical and current literature. Prerequisite: graduate standing. Offered: A.

FISH 504 Fish and Shellfish Pathology (5) *Landolt* Pathological effects of infectious and non-infectious diseases in fish and shellfish. Emphasis on immunological responses, contemporary diagnostic methods, control strategies, and environmental factors that influence disease transmission. Offered: W.

FISH 507 Special Problems in Fisheries (1-5, max. 15) Classroom, laboratory, or field studies on problems of current interest. A maximum of 6 credits of 507 is permitted to apply to a master's degree program. A. Guest lecture series. Offered on credit/no credit basis only. B. Special problems. C. Special course in fisheries. D. Special course in fisheries. Prerequisite: permission of instructor.

FISH 515 Advanced Topics in Physiology (3) *Dickhoff* Integration of physiological processes from molecular to organ system levels. Recent advances in control of reproduction, development, growth, metabolism, and osmoregulation. Prerequisite: 415 or equivalent; recommended: BIOC 405, 406 or BIOC 440, 441, 442; ZOOL 438. Offered: even years; W.

FISH 520 Graduate Seminar (1) Introduction to research in fisheries. Required of all first-year graduate students. Offered on credit/no credit basis only.

FISH 522 Classical Literature of Fisheries Science and Aquaculture (2) Discussion of the classic literature of fisheries science and aquaculture. Both oral and writing communication skills stressed. Credit/no credit only. Offered: WSp.

FISH 525 Ecology and Behavior of Fishes (3) *Armstrong, Foote* Basic principles of ecology and behavior (e.g., habitat associations, competition and predation, migrations and movements, reproductive patterns) as applied to fishes. Critical evaluation of current literature and fieldwork required. Prerequisites: 311 or equivalent, and permission of instructor. Offered: Sp.

FISH 527 Aquatic Community Responses to Chemical Stress (3) *Taub* Aquatic ecotoxicology; bridging the gap between physiological and ecosystem responses to toxic chemicals. Detecting effects against natural variability; altered species abundances and dominance, counter-intuitive responses. Case histories, controversies on data interpretation. Prerequisite: at least one course in ecology, limnology, oceanography or permission of instructor. Offered: Sp.

FISH 535 Aquatic Toxicology (4) *Kocan* Principles of toxicology applied to aquatic organisms. Recognition of physiological and biochemical responses of organisms to toxins and practical applica-

tion of toxicity testing methods to identification of pollution and toxins in aquatic environment. Toxicity test design, interpretation, and data analysis. Prerequisites: organic or biochemistry and physiology or equivalent. Offered: odd years; W.

FISH 539 Forestry-Fisheries Interactions: Case Studies (3) *Naiman, Wissmar* Case studies of streamside management situation at the watershed and basin level. Topics include resource conflict resolution, current and future management alternatives, landscape dynamics, role of disturbance, and policy options. Prerequisite: graduate standing in forestry, fisheries, or related field; undergraduates by permission of instructor. Offered: jointly with ESC 539; odd years, A.

FISH 542 Principles and Applications of Molecular Methods (3) *Bentzen* Techniques of molecular analysis with emphasis on DNA methods, including PCR, DNA sequencing, RFLP, RAPD and VNTR analysis and cloning. Applications of these techniques to fisheries, aquaculture, oceanography, population and evolutionary studies, and other areas of science. Prerequisite: permission of instructor. Offered: jointly with OCEAN 574; A.

FISH 543 Molecular Techniques (4) *Bentzen* Laboratory on DNA methods. Experiments analyzing genetic variation at the intra- and interspecific level, including one experiment of student's own design. Techniques include DNA extraction and quantification, PCR, DNA sequencing, RFLP analysis and cloning. Prerequisite: 542 or permission of instructor. Offered: jointly with OCEAN 575; Sp.

FISH 544 Genetics in Fish Management and Production (3) *Hershberger* Possible changes in genetic characteristics and response of populations with the current types and levels of fisheries resource manipulation. Includes genetic considerations in population models, quantitative genetics and breeding, and use of genetic markers for population analysis. Prerequisites: 444, 451, Q SCI 482, 483, and upper-division or graduate standing. Offered: odd years, Sp.

FISH 547 Stream and River Ecology (4) *Naiman* Characterizations of stream and river ecosystems from a watershed perspective. Emphasis on fundamental processes affecting the structure and dynamics of aquatic communities and the riparian zone. Resource conflicts, new technologies, field trips, and class projects. Recommended: general ecology, forestry-fisheries interactions. Offered: jointly with ESC 547; Sp.

FISH 548 Special Topics in Streamside Studies (2, max. 6) *Naiman, Wissmar* Contemporary problems and issues in forestry, fisheries, and wildlife management in watersheds. Topics vary, yet focus on interactions of land and water resources in the forests of the Pacific Northwest. Prerequisite: permission of instructor. Offered: jointly with ESC 548; A.

FISH 551 Advanced Topics in Aquaculture (3) Current topics in aquaculture. Critical review of the literature and hands-on application of skills and techniques in aquaculture. One of the following topics offered each year: aquaculture engineering, larviculture of aquatic animals, shellfish hatchery management, environmental microbiology, and mariculture.

FISH 552 Current Topics in Fish Nutrition (5) *Dong* Nutrient requirements of finfish and shellfish for growth, development, and reproduction. Feed ingredient classification, processing, and nutrient profiles. Fish feed formulation techniques. Critical review of historical papers and current literature in finfish and shellfish nutrition. Offered: Sp.

FISH 556 Mathematical Analysis in Fisheries Stock Assessment (3) *Gallucci* Analytic approaches to stock assessment and population management applications of parent-progeny models and logistic models; biological and economic yields of

natural populations; analysis of population data on computers. Prerequisites: Q SCI 292, Q SCI 392, Q SCI 456, Q SCI 483; or permission of instructor. Offered: jointly with Q SCI 556; alternate years.

FISH 557 Estimation of Population Parameters (4) *Skalski* Statistical analysis of population data; design and analysis of mark-recapture experiments on natural populations; laboratory work on computers. Prerequisites: Q SCI 292, Q SCI 483, and probability theory. Offered: jointly with Q SCI 557; alternate years.

FISH 558 Advanced Analysis in Fisheries Stock Assessment (3) *Hilborn* Deterministic and stochastic representations of age-dependent and size-dependent models for stock assessment; analysis of multi-species models; risk analysis and uncertainty in fisheries management strategies; analysis of population data on computers. Prerequisite: Q SCI 393, 556 or permission of instructor; recommended: 557. Offered: jointly with Q SCI 558; alternate years.

FISH 560 Methods of Acoustic Stock Assessment (3) *Gunderson* Theory and implementation of processing of acoustic fish target signals. Application for estimation of fish stocks and the statistical properties of the estimation procedure. Offered: alternate years; Sp.

FISH 565 Marine Fish Biology (9) *Miller* Taxonomy, ecology, and life history of the fishes of the San Juan Islands and northeast Pacific Ocean. Prerequisite: permission of instructor. Offered: Friday Harbor Laboratories; odd years; S.

FISH 580 Introduction to the Management of Fisheries (3) *Gallucci, Miller* Introduction to fisheries and the multidisciplinary aspects of their management. Emphasis is on integration of biological, socio-economic, and institutional aspects of fisheries management. Offered: jointly with SMA 580.

FISH 581 Fishery Management: Case Studies (5) *Francis, Huppert, Pikitch* Examination of historical case studies chosen to illustrate specific fishery management problem areas. Faculty presentations occupy first half of quarter, student presentations the second half. Prerequisite: 580. Offered: jointly with SMA 581.

FISH 582 Fishery Management: Contemporary Issues (5) *Francis, Huppert* Focuses on multi-disciplinary, in-depth analysis of specific problems, including biological and economic assessments, evaluation of alternative management systems, and formulation of specific research, data collection, and management recommendations. Prerequisite: 581. Offered: jointly with SMA 582.

FISH 600 Independent Study or Research (*) Offered on credit/no credit basis only. Offered: AWSpS.

FISH 700 Master's Thesis (*) Offered on credit/no credit basis only. Offered: AWSpS.

FISH 800 Doctoral Dissertation (*) Offered on credit/no credit basis only. Offered: AWSpS.

Marine Affairs

3707 Brooklyn Avenue Northeast

Graduate Program

Master of Marine Affairs

The School of Marine Affairs offers an interdisciplinary program of study leading to the Master of Marine Affairs degree. Marine affairs concerns management and policy questions on the uses of the coastal and offshore regions of the ocean and their resources. The core curriculum includes courses from marine affairs, business administration, economics, engineering, fish-

eries, law, oceanography, political science, and public affairs. The School of Law has a related Master of Laws degree program with specialization in marine affairs.

A major program objective is to prepare students for professional careers in policy making, management, teaching, and research. Breadth of study is emphasized, and all students are expected to gain familiarity with relevant aspects of the social, technological, and environmental sciences. In addition, each student is expected to develop a professional and scholarly proficiency in a particular aspect of marine affairs.

Completion of the M.M.A. program normally requires two academic years for students who have recently received a baccalaureate degree. During the first year, students develop a comprehensive understanding of the marine affairs field and acquire analytic skills. During the second year, a special competence is developed in an area of concentration (e.g., coastal zone planning and management, marine societies, institutions, and decision processes, living marine resources and fishery management, marine environmental protection, ports and marine transportation), and a thesis is prepared and presented under the guidance of a faculty supervisory committee. Individual courses of study may be adjusted to accommodate prior experience and academic background, and especially qualified students, such as those in midcareer, may be able to meet the degree requirements in eighteen months of study.

Joint Curriculum in Fisheries Management

The School of Fisheries (SOF) and the School of Marine Affairs (SMA) offer a joint curriculum in fishery management consisting of parallel two-year master's programs. The curriculum is designed to develop professional fisheries managers with skills needed to participate effectively in the wide range of activities characteristic of contemporary fishery management. These skills require a multi-disciplinary education in biology, the social sciences (e.g., economics, political science, anthropology, sociology), quantitative methods, law, and policy analysis. A major part of the curriculum consists of a three-quarter core course which brings SOF and SMA students together in a problem-oriented focus. This core course has three components: (1) introduction to fisheries and their management, (2) retrospective case studies, and (3) contemporary issues. During the core sequence, students will develop progressively more extensive case studies on their own, leading to a master's thesis. Students may enter the fisheries management master's program through either the School of Fisheries or the School of Marine Affairs and must meet the thesis and other requirements of their department.

Admission Requirements

Admission to the School of Marine Affairs is based on evaluation of required application materials in competition with other applicants. Required materials include Graduate Record Examination general test scores, completed departmental supplementary information form, three letters of recommendation, official academic transcripts, and a statement of career objectives. In addition, applicants must make separate application to, and be accepted by, the Graduate School of this university. Course sequences begin each autumn quarter, and new students normally are admitted only at that time.

Financial Aid

The School of Marine Affairs has a limited number of positions for graduate student appointments as research assistants. Applicants in need of support are urged to investigate outside sources of funding.

Correspondence and Information

Graduate Program Coordinator
School of Marine Affairs, Box 355685

Faculty

Director

Marc Hershman

Professors

Alverson, Dayton L. * 1980, (Affiliate); PhD, 1967, University of Washington; marine affairs.

Bodansky, Daniel * 1989, (Adjunct); JD, 1984, Yale University; international law, international environmental and human rights law, civil procedure.

Burke, William T. * 1968; JD, 1953, Indiana University; JSD, 1959, Yale University; marine law.

Crutchfield, James A. * 1960, (Emeritus); PhD, 1954, University of California (Berkeley); natural resources economics, policy and management, especially marine and environmental resources.

Delaney, John R. * 1977, (Adjunct); PhD, 1977, University of Arizona; geological oceanography, origin of oceanic crust, igneous petrology.

Francis, Robert C. * 1983, (Adjunct); PhD, 1970, University of Washington; fishery oceanography, effects of climate on marine ecosystems, paleoecology, fisheries management.

Gallucci, Vincent * 1976, (Adjunct); PhD, 1971, North Carolina State University; biomathematics and population dynamics.

Hershman, Marc * 1976; JD, 1967, Temple University; LL.M., 1970, University of Miami (Florida); coastal zone management law.

Miles, Edward L. * 1974; PhD, 1965, University of Denver; international law and organization, science and international relations, marine policy.

Miller, Marc * 1979; PhD, 1974, University of California (Irvine); maritime anthropology, cognitive anthropology and social/cultural change.

Olson, David J. * 1974, (Adjunct); PhD, 1971, University of Wisconsin; American government and politics (urban, state, and labor relations).

Vesper, Karl H. * 1969; PhD, 1969, Stanford University; business policy, mechanical engineering, marine studies.

Wooster, Warren S. * 1976, (Emeritus); PhD, 1953, University of California (San Diego); effects of climate change on marine ecosystems, use of scientific information in marine management.

Associate Professors

Copping, Andrea * 1992, (Affiliate); PhD, 1982, University of Washington; marine environment and water quality, marine science/marine policy.

Duxbury, Alyn C. * 1954, (Emeritus); PhD, 1963, Texas A&M University; estuarine processes and the management of human uses of these marine systems.

Fluharty, David L. * 1983, (Research); PhD, 1977, University of Michigan; natural resource and environmental policy.

Huppert, Daniel D. * 1987; PhD, 1975, University of Washington; economics and management of natural resources, especially marine fisheries.

Kaczynski, Włodzimierz M. * 1977; PhD, 1973, University of Gdansk (Poland); fishery economics, international joint ventures in marine fisheries, international fisheries policy.

Leschine, Thomas M. * 1983; PhD, 1975, University of Pittsburgh; marine pollution management, ocean policy studies.

Assistant Professor

Olson, Annette M. * 1991; PhD, 1992, Oregon State University; use of ecological models in environmental decision making.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

SMA 455 Marine Business Environment in Russia and Eastern Europe (3) Kaczynski International marine business environment of Russia and the maritime nations of East Europe; their transition process from communist to free market economic systems. Covers aspects of doing business in marine-related fields such as shipping, fisheries, shipbuilding, ports, and land infrastructures, marine tourism, and water sports. Offered: jointly with SISRE 455.

SMA 499 Undergraduate Research (1-3, max. 6) Research on assigned topics under the supervision of faculty members. Prerequisite: permission of instructor.

Courses for Graduates Only

SMA 500 Marine Affairs (5) Miller Surveys a wide range of academic disciplines and substantive problems pertinent to interaction of human beings and the world's oceans and coasts. Management of living/nonliving resources, shipping, scientific research, pollution, recreation, and others. Lecture and discussion by invited specialists.

SMA 505 Introduction to Administrative Law and Process (2) Hershman Constitutional and administrative law applied to selected coastal and marine statutes. How to research legislative and administrative materials. Reading and briefing selected judicial opinions. Control of administrative agencies by the executive, legislative, and judicial branches. Designed for non-law graduate students pursuing natural resources and environmental subjects. Prerequisite: permission of instructor.

SMA 506 International Law of the Sea (4) Burke Ways nations claim authority to regulate activities at sea. Fundamental policies and decisions regarding navigation for commercial and military purposes, fisheries, exploitation and conservation, continental shelf resources, scientific research, protection of environment, deep-sea mining, and other uses of the ocean. Offered: jointly with LAW B 561.

SMA 507 International Organizations and Ocean Management (3) Miles Survey of the manner in which international organizations attempt to manage and regulate the uses of the ocean. Primary emphasis is on the analysis of processes that support or constrain these organizations and on the search for alternative policies and organizations. Prerequisite: 500 or permission of instructor. Offered: jointly with PB AF 507.

SMA 508 National Marine Policy Processes (3) Miles Comparative institutional dimensions of marine policy processes. Marine policy context at the national level and the dynamics that drive policy formulation and policy implementation. Prerequisite: 507 or permission of instructor.

SMA 509 Principles of Coastal Zone Management (3) Hershman Managing multiple uses of coastal waters and the adjacent land; conflicts arising from competition for space and resources; legal and organizational problems associated with overlapping jurisdiction; legal basis for management; planning and management experience in the United States and abroad. Prerequisite: 500 or permission of instructor. Offered: jointly with LAW B 566.

SMA 510 Ecological Concepts for Decision-makers (3) Olson Evaluation of ecological assumptions implicit in discussion, development, and implementation of environmental policy. Lectures focus on marine environmental policy debates and decisions that exemplify the use of ecological concepts. Group projects to evaluate the ecological foundations of management plans, regulations, legislation, or other policy problems.

SMA 511 Coastal Environment Management (3) Coastal zone planners and managers evaluate proposed and ongoing use activities that affect wetland, estuarine, and nearshore environments. Concepts and techniques for retrieving, analyzing, and using technical environmental information in planning and decision making. Washington State case examples and practical exercises.

SMA 514 Marine Pollution Management Issues (3) Leschine Management aspects of marine pollution, emphasizing two-way interaction between environmental managers and environmental and policy scientists which ideally shapes policy. Recommended: familiarity with marine science or ocean policy or pollution control policy.

SMA 515 United States Law and the Marine Environment (3) Hershman Federal/state boundary problems, living resources management, offshore oil and gas production, vessel and tanker safety. Offered: jointly with LAW B 565.

SMA 516 Seaport Management (3) Denning Role of port authorities in management of marine uses: cargo and trade, economic development, tourism and recreation, and fisheries. Management functions of planning, marketing, finance, engineering. Examples and guest speakers from the Port of Seattle and other Puget Sound ports. Prerequisite: 500 or permission of instructor.

SMA 517 Marine Uses: Transportation and Commerce (3) Denning Role of the oceans in the transportation of people and materials, character and trends in vessel design and terminal facilities, pattern and nature of industry organization, regulations, economics of the shipping industry, management of fleets and vessels, individuals at sea and ashore, national policies affecting the merchant marine and port facilities. Prerequisite: 500 or permission of instructor.

SMA 518 Port and Marine Transportation Systems (3) Activities associated with the water-borne movement of cargo. Types of cargo handling methodologies used in ocean transport, ship types involved in these cargo-handling methods, and seaport terminal facilities that are utilized by each cargo handling method. Prerequisite: permission of instructor.

SMA 519 Marine Policy Analysis (3) Leschine Goal is appreciation for and basic working knowledge of techniques used in policy analysis. Techniques are explored in both quasi-realistic settings and in application to real world problems of marine policy.

SMA 536 Applied Microeconomics for Marine Affairs (3) Acquaints students with microeconomic tools commonly employed in policy analysis. Emphasis is placed on mastery of basic concepts, definitions, and models useful to marine policy, including determinants of price and outputs in competitive markets, effects of other market structures, market failure, and applied welfare economics.

SMA 537 Economic Aspects of Marine Policy I (3) Huppert Development of pertinent economic concepts and their application to selected topics in marine policy decision making, including maritime policy, OCS oil and gas development, and wetlands management. Prerequisite: 500 or permission of instructor. Offered: jointly with ECON 537.

SMA 538 Economic Aspects of Marine Policy II (3) Huppert Development of pertinent economic concepts and their application to fisheries manage-

ment and development. Prerequisite: 500 or permission of instructor. Offered: jointly with ECON 538.

SMA 540 Economics of World Fisheries (3) *Kaczynski* Economic view of contemporary world problems in use, conservation, and management of marine living resources. Special focus on North-South relations, sustainable development strategies, and basic needs of Third World. How to approach and analyze international fisheries issues in student's own research. Prerequisite: 500 or permission of instructor.

SMA 550 Special Topics in Marine Studies (1-3, max. 18) Examination of various aspects of marine studies. Content varies, depending upon the interests of the faculty and students. Intended for the joint participation by the faculty and advanced students in the investigation of selected topics. One or more groups are organized each quarter.

SMA 555 Russian Ocean Policy (3) *Kaczynski* Russian ocean policy following Perestroika and disintegration of Soviet empire. Discusses Russian navy, fishery industry, merchant marine, ocean research fleet in light of international agreements and joint ventures and new politic, economic, and social environments. Prerequisite: knowledge of Soviet/Russian socio-economic problems or permission of instructor. Offered: jointly with SISRE 555.

SMA 560 Methods Seminar (2) Preparation for thesis work. Draws on the philosophy of science from the natural, social, and policy sciences to examine such topics as research design, data collection, analysis, write-up, and abstract/applied research.

SMA 580 Introduction to the Management of Fisheries (3) *Miller* Introduction to fisheries and the multidisciplinary aspects of their management. Emphasis is on integration of biological, socio-economic, and institutional aspects of fisheries management. Offered: jointly with FISH 580.

SMA 581 Fishery Management: Case Studies (5) *Huppert* Examination of historical case studies chosen to illustrate specific fishery management problem areas. Faculty presentations occupy first half of quarter, student presentations the second half. Prerequisite: 580 or permission of instructor. Offered: jointly with FISH 581.

SMA 582 Fishery Management: Contemporary Issues (5) *Huppert* Focuses on multi-disciplinary, in-depth analysis of specific problems, including biological and economic assessments, evaluation of alternative management systems, and formulation of specific research, data collection, and management recommendations. Prerequisite: 580, 581 or permission of instructor. Offered: jointly with FISH 582.

SMA 600 Independent Study or Research (*)

SMA 700 Master's Thesis (*)

Oceanography

108 Oceanography Teaching

The School of Oceanography, which had its beginnings in 1930, offers courses and conducts basic research in oceanography, the science that examines physical, geological, chemical, and biological processes in the ocean and interactions of the ocean with the earth, the biosphere, and the atmosphere. Education and research in the School include studies of seawater in motion; life in the sea; chemical composition and properties of seawater; interactions between the sea and the atmosphere, the sea and the land, sediments and rocks beneath the sea; and the geophysics of the ocean floor. Because the science of oceanography is interdisciplinary in nature, joint programs are maintained in the areas of geochemistry and biochemistry, geophysics, atmospheric sciences, ma-

rine biology and botany, and geophysical fluid dynamics, with the departments of Botany, Zoology, Atmospheric Sciences, Applied Mathematics, Geophysics, and Geological Sciences, and with the other units in the College of Ocean and Fishery Sciences.

Courses

A full spectrum of basic and advanced courses is offered in each of the areas of specialization in oceanography: biological oceanography, chemical oceanography, marine geology and geophysics, and physical oceanography. Among the wide variety of courses open to students are the following: zooplankton ecology, marine microbiology, advanced problems in chemical oceanography, ocean and climate variation, sedimentary dynamics and history of the ocean, marine science of coastal zone management, and human impacts on the ocean.

Summer quarter instruction is offered both on the main campus and at the Friday Harbor Laboratories on San Juan Island.

Advising

The Student Services Office is staffed by an academic counselor, who assists students with curriculum, scheduling, and career counseling. Students also consult with a faculty adviser.

Research

Each year the School participates in a broad range of oceanographic investigations, ranging from individual research projects to multidisciplinary or multiuniversity projects. Major biological programs are carried out in Puget Sound, in the waters of the continental shelf off Washington and California, and in the North Pacific Ocean. These projects include investigations of the processes governing the communities or organisms in the water column, on the seabed, and in the surf zone. Chemical oceanography includes work on the distribution of organic material and trace metals in Puget Sound and the open sea, the geochemistry of the sediment-water interface, and study of chemical processes in waters trapped in the sediments. Geological investigations include theoretical studies and field experiments on sediment motion and sedimentary processes. This work has ranged from the deep waters of the Scotian Rise in the Atlantic Ocean to Prudhoe Bay to the Barents Sea, where a cooperative program with Norwegian scientists is under way.

The effect of organisms on sediment transport is a major new interdisciplinary program among geological, biological, and physical oceanographers. Geophysical research is concerned with the oceanic crust and upper mantle. Topics include seismic experiments on plate boundaries, crustal formation processes in the Juan de Fuca-Gorda Ridge System, and studies of the earth's magnetic field. Physical oceanographic programs range from large-scale circulation studies of the North Pacific, the North Atlantic, the tropical oceans, and the antarctic circumpolar current to coastal circulation studies and small-scale mixing programs. The theoretical and experimental programs include studies of air-sea interaction, surface and internal waves, oceanic fronts, and sea ice.

The School is particularly strong in arctic research, which includes both physical oceanographic studies and multidisciplinary ecosystem studies of the processes and resources in the Bering Sea. Studies in local waters include sediment transport and mixing processes in fjords and inlets and the chemistry of Lake Washington.

Facilities and Vessels

Housed in four large and several smaller buildings on campus by Portage Bay, the School is equipped with extensive laboratories and teaching facilities, including controlled-environment rooms, a paleomagnetism laboratory, and a sea-ice laboratory. The School operates its own midscale interactive computer and highly

specialized laboratory instruments, such as mass spectrometers, scanning electron microscopes, and seawater sediment transport flumes. Access to other more sophisticated facilities and instruments, as well as super computers, is available on campus. Docks provide mooring for the School's two research vessels. Deep-ocean research programs are accommodated on the 274-foot *R/V Thomas G. Thompson*. Graduate students are involved in all of the cruises, most often for their thesis research. The 65-foot *R/V Clifford A. Barnes* undertakes short cruises into Lake Washington and Puget Sound for the instructional and research programs.

Friday Harbor Laboratories on San Juan Island offer unique opportunities for research and study. Specialized courses in new areas of oceanography are offered each summer. The facilities are utilized by faculty members and students throughout the year for oceanographic research.

Funding

The School is supported primarily by funds from the state of Washington and federal agencies. Major sources of federal funding include the National Science Foundation, National Oceanic and Atmospheric Administration, Office of Naval Research, and Department of Energy. Funds are also provided by various state and local government agencies and private organizations.

Undergraduate Program

Students may earn a Bachelor of Science or a Bachelor of Arts degree, with specialization in biological, chemical, or physical oceanography, or marine geology and geophysics.

Careers in Oceanography

Oceanographers are employed predominantly in research, both pure and applied. They seek to produce a new understanding of an ocean system and to explore the potential consequences to the marine environment of human activities. They collect samples and data, analyze and interpret them, and prepare and disseminate the results. Oceanographers work at sea, on land, and in laboratories, often with computers.

In addition, a degree in oceanography can serve as a background for a career in teaching, administration, marine affairs, environmental studies, production, inspection, computing, instrumentation development, and statistical analysis.

Most oceanographers are employed in educational and research institutions. Many others work for federal government agencies, such as the National Oceanic and Atmospheric Administration, U.S. Geological Survey, Office of Naval Research, U.S. Department of Interior, U.S. Coast Guard, Naval Oceanographic Research and Development Activity, and National Marine Fisheries Service. Other employers include state and local governments in coastal areas and independent consulting firms that conduct research for companies and government agencies. Additional private-sector positions are available in research and development for companies extracting and harvesting products from the oceans.

An oceanographer's duties are diverse, dictated by the nature of the profession. Research projects are as varied as an oceanographer's responsibilities. The field is open to both women and men. Graduates from the oceanography program are prepared to enter the profession or to pursue graduate studies.

High School Preparation

A high school student considering oceanography as a career should be guided by an interest in natural

sciences and a good record in high school science courses, and particularly mathematics. A student should plan to meet or exceed the general University entrance requirements. One year each of biology, chemistry, and physics is recommended.

Admission

The School of Oceanography has no admission requirement. Students may enter the program upon acceptance for admission to the University.

Bachelor of Science

Major Requirements: (1) MATH 124, 125, 126; CHEM 140, 141, 150, 151; PHYS 121/131, 122/132, 123/133; GEOL 205; and BIOL 101-102 or 201, 202, 203; (2) OCEAN 200, W201, 202, 401, 402, 421, 433, 450, W460, W485; (3) 20 credits of upper-division science, mathematics, or engineering to be selected in the student's area of specialization in consultation with a faculty adviser; (4) 20 credits of Visual, Literary, & Performing Arts and 20 credits of Individuals & Societies from the University Areas-of-Knowledge lists; and (5) 5 credits of English composition. University-approved W courses (writing) are included within the curriculum.

Bachelor of Arts

Major Requirements: Same as for Bachelor of Science degree, except only 10 credits of upper-division science, mathematics, or engineering courses are required.

Minor

Minor Requirements: Minimum 27 credits to include OCEAN 200, 202, 401, 402, 421, 433, 450, 485. Prerequisites include MATH 124, 125, 126; PHYS 121/131, 122/132, 123/133; CHEM 140, 141, 150, 151; BIOL 101-102 (or 201, 202, 203); GEOL 205.

Student Oceanographic Society

The Student Oceanographic Society is an undergraduate organization for students majoring in oceanography. The society coordinates tours of the facilities and elects the undergraduate representatives to the School's student council. The club also provides the students with an informal environment for meeting with the faculty and other students who share an interest in the marine sciences.

Correspondence and Information

Student Services
School of Oceanography, Box 357940
email: student@ocean.washington.edu

Graduate Program

Arthur R. M. Nowell, Director and
Graduate Program Coordinator

The School of Oceanography provides excellent instruction and research opportunities at the graduate level in all areas of oceanography: biological oceanography, chemical oceanography, marine geology and geophysics, and physical oceanography. The program of study emphasizes independent research in conjunction with basic and specialized courses. Interdisciplinary research is encouraged, and students enjoy the opportunity to work across the usual scientific boundaries. Course work during the first two years is required in each option; specialized course work is structured to fit the student's background and objectives. Foreign-language proficiency is required only when deemed crucial to scholarly research.

Admission

Students enter the School from varied undergraduate disciplines at many universities. All have in common a strong background in the sciences and mathematics; most have never taken courses in oceanography.

Evaluation of candidates is based on Graduate Record Examination scores, the undergraduate transcript (scholarship and depth), three letters of recommendation, and the applicant's statement of objectives and interests. Admission can be accommodated at the beginning of any academic quarter, although autumn entry is most common.

Master of Science

The program of study includes course work in the student's area of interest and the other oceanography options, and the completion of an approved research project and oral presentation of the results. Thesis and nonthesis programs are offered; most students select the nonthesis option.

Doctor of Philosophy

The degree program places a strong emphasis on research following completion of course requirements and General Examination. Upon successful completion of the General Examination, the student undertakes an original research investigation, which is described in the dissertation and defended during the Final Examination.

Financial Aid

Normally all students pursuing a graduate degree are supported by research or teaching assistantships, or by fellowships and scholarships from national or private sources. Most appointments continue through the summer when students are engaged in research.

Correspondence and Information

Student Services
School of Oceanography, Box 357940
email: student@ocean.washington.edu

Faculty

Director

Arthur R. M. Nowell

Professors

Aagaard, Knut * 1968; PhD, 1966, University of Washington; physical oceanography, ocean circulation, arctic oceanography.

Ahmed, Saiyed I. * 1973; PhD, 1963, Johann Wolfgang Goethe University (Germany); marine phytoplankton, ecology and nitrogen assimilation, biofouling, anoxic marine environments.

Anderson, George C. * 1972, (Emeritus); PhD, 1954, University of Washington; plankton ecology, biological oceanography.

Banse, Karl * 1960, (Emeritus); Doctoral, 1955, University of Kiel (Germany); biological oceanography, plankton production and methodology, polychaete systematics.

Baross, John A. * 1984; PhD, 1973, University of Washington; microbial oceanography, bacterial ecology.

Cannon, Glenn A. * 1983, (Affiliate); PhD, 1969, Johns Hopkins University; physical oceanography of coastal waters and deep-sea hydrothermal venting.

Carpenter, Roy * 1968; PhD, 1968, University of California (San Diego); marine geochemistry of metals and hydrocarbons in coastal zones.

Creager, Joe S. * 1958, (Emeritus); PhD, 1958, Texas A&M University; geological oceanography, sedimentology.

D'Asaro, Eric A. * 1980; PhD, 1980, Massachusetts Institute of Technology; physical oceanography, internal waves, turbulence and mixing processes.

Delaney, John R. * 1977; PhD, 1977, University of Arizona; geological oceanography, origin of oceanic crust, igneous petrology.

Deming, Jody W. * 1988; PhD, 1981, University of Maryland; evolution and ecology of marine bacteria in the pressurized ocean.

Devol, Allan H. * 1975; PhD, 1975, University of Washington; biogeochemistry, sediment diagenesis, anoxic systems, carbon fluxes.

Emerson, Steven R. * 1976; PhD, 1974, Columbia University; marine geochemistry, chemical oceanography, sediment diagenesis.

Eriksen, Charles C. * 1986; PhD, 1977, Massachusetts Institute of Technology; experimental physical oceanography; equatorial and upper ocean dynamics, internal waves.

Ewart, Terry E. * 1956; PhD, 1965, University of Washington; physics, ocean microstructure, diffusion, acoustic transmission.

Frost, Bruce W. * 1969; PhD, 1969, University of California (San Diego); biological oceanography, marine zoogeography, plankton ecology and systematics.

Gregg, Michael C. * 1974; PhD, 1971, University of California (San Diego); physical oceanography, ocean microstructure.

Harrison, Donald E. * 1985, (Affiliate); PhD, 1977, Harvard University; ocean circulation modeling, air-sea interaction, ocean and climate dynamics.

Heath, G. Ross * 1984; PhD, 1968, University of California (San Diego); geochemistry of sediments.

Hedges, John I. * 1976; PhD, 1975, University of Texas (Austin); organic geochemistry, sources, transport, fate of organic material in coastal zones.

Hickey, Barbara M. * 1973; PhD, 1975, University of California (San Diego); physical oceanography, dynamics of equatorial and shelf circulation.

Johnson, Harlan Paul * 1976; PhD, 1972, University of Washington; paleomagnetism and marine geophysics.

Jumars, Peter A. * 1975; PhD, 1974, University of California (San Diego); biological oceanography, benthos, biological sedimentary dynamics and spatial statistics.

Lewis, Brian T. * 1970; PhD, 1970, University of Wisconsin; marine geophysics, marine seismology, gravity, magnetics, and computer modeling of those processes.

Martin, Seelye * 1969; PhD, 1967, Johns Hopkins University; geophysical fluid dynamics, properties of sea ice.

McManus, Dean A. * 1959; PhD, 1959, University of Kansas; geological oceanography, continental shelf sediments.

McPhaden, Michael J. * 1982, (Affiliate); PhD, 1980, Scripps Oceanographic Institution; equatorial ocean dynamics, climate scale air-sea interaction.

Murray, James W. * 1973; PhD, 1973, Massachusetts Institute of Technology; marine geochemistry, aquatic chemistry.

Nowell, Arthur R. M. * 1978; PhD, 1975, University of British Columbia (Canada); physical oceanography, turbulent boundary layer dynamics, sediment transport.

Quay, Paul D. * 1977; PhD, 1977, Columbia University; chemical oceanography, stable isotope geochemistry, ocean tracers and mixing.

Rhines, Peter B. * 1984; PhD, 1967, Cambridge University (UK); the circulation of the oceans and evolution of climate.

Richey, Jeffrey E. * 1973; PhD, 1973, University of California (Davis); quantitative problems of aquatic ecosystems, primary Amazon River, limnology.

Sanford, Thomas B. * 1979; PhD, 1967, Massachusetts Institute of Technology; physical oceanography, dynamics of ocean currents, motional induction, instrumentation.

Sternberg, Richard * 1965; PhD, 1965, University of Washington; geological oceanography, marine sedimentation processes.

Tipper, Ronald C. 1994, (Acting); PhD, 1968, Oregon State University.

Welander, Pierre * 1973, (Emeritus); PhD, 1954, University of Stockholm (Sweden); theory of general ocean circulation, large-scale atmosphere-ocean interaction.

Associate Professors

Duxbury, Alyn C. * 1954, (Emeritus); PhD, 1963, Texas A&M University; estuarine processes and the management of human uses of these marine systems.

Feely, Richard A. * 1983, (Affiliate); PhD, 1974, Texas A&M University; chemical oceanography, oceanic sources and sinks for carbon dioxide.

Howe, Bruce M. 1988, (Research); PhD, 1986, University of California (San Diego); physical oceanography, acoustic tomography.

Kawase, Mitsuhiro * 1988; PhD, 1986, Princeton University; geophysical fluid dynamics; oceanic general circulation; tracer oceanography.

Kunze, Eric L. * 1987; PhD, 1985, University of Washington; mesoscale phenomena, wave/mean flow interaction double diffusion and mixing.

Lilley, Marvin D. * 1984; PhD, 1983, Oregon State University; chemical oceanography.

McDuff, Russell E. * 1981; PhD, 1978, University of California (San Diego); marine geochemistry.

Perry, Mary J. * 1976; PhD, 1974, University of California (San Diego); biological oceanography, phytoplankton physiology, nutrient cycling.

Riser, Stephen C. * 1981; PhD, 1981, University of Rhode Island; physical oceanography, mesoscale mixing, physics of mesoscale eddies, numerical modeling.

Rothrock, David A. * 1970; PhD, 1969, Cambridge University (UK); physical oceanography, polar oceanography, polar ice remote sensing and modeling.

Sempere, Jean-Christophe * 1987; PhD, 1986, University of California (Santa Barbara); marine geophysics, magnetics, gravity, theoretical models, sea floor morphology.

Shen, Glen T. * 1988; PhD, 1986, Massachusetts Institute of Technology; chemical oceanography, trace element geochemistry, paleoclimate.

Assistant Professors

Armbrust, E. Virginia 1996; PhD, 1990, Massachusetts Institute of Technology; biological oceanography.

Hautala, Susan L. 1994; PhD, 1992, University of Washington; physical oceanography, abyssal and paleoabyssal circulation.

Keil, Richard G. 1995, (Research); PhD, 1991, University of Delaware; chemical oceanography, marine organic chemistry.

Lessard, Evelyn J. * 1989, (Research); PhD, 1984, University of Rhode Island; microzooplankton ecology and physiology; physical/biological interactions at oceanic fronts.

MacCready, Parker 1994, (Research); PhD, 1991, University of Washington; physical oceanography, modeling of plumes, dynamics of flows.

Stein, Carol L. * 1993, (Research); PhD, 1977, Harvard University; chemical oceanography, sediment diagenesis, fluid flow and transport processes.

Thompson, Luanne * 1990; PhD, 1990, Massachusetts Institute of Technology; numerical modeling of mesoscale and general circulation of the oceans.

Warner, Mark J. * 1989, (Research); PhD, 1988, University of California (San Diego); physical oceanography, ocean ventilation and mixing processes.

Wilcock, William S. D. 1993; PhD, 1992, Massachusetts Institute of Technology; marine seismology, dynamics of mid-ocean ridges, geological fluid dynamics.

Senior Lecturer

Emerick, Christina M. 1985; PhD, 1985, Oregon State University; marine geochemistry and tectonics.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

OCEAN 100 Introduction to Careers in the Marine Sciences (1) NW Presentations by various faculty and staff members, students and recent graduates offer an introduction to the College of Ocean and Fishery Sciences, curricular options, and professional opportunities in the marine sciences. Limited to freshmen, sophomores or transfer juniors. Offered: jointly with FISH 100; Sp.

OCEAN 101 Survey of Oceanography (5) NW Origin and extent of the oceans; nature of the sea bottom; causes and effects of currents and tides; animal and plant life in the sea. Intended for nonmajors. Offered: AWSpS.

OCEAN 102 Environmental Oceanography (5) NW Designed to study in detail the benefits and the scientific problems created by human activities impinging on the oceanic environment. Prerequisite: 101 or permission of instructor. Offered: Sp.

OCEAN 200 Introduction to Oceanography (3) NW Description of the oceans. Emphasis on relations of biology, chemistry, geology, and physics in marine environments. Examination of relationships and interactions at macro-, meso-, and microscales in the ocean. Intended for science majors. Offered: A.

OCEAN 201 Introduction to Field Oceanography (3) NW Methods of oceanographic field study. Instruments and sampling techniques. Writing assignment to teach report-writing skills. Prerequisite: oceanography major or permission of instructor. Offered: Sp.

OCEAN 202 Ocean Circulation (3) NW The large-scale circulation of the ocean. Topics include temperature-salinity analysis; water mass identification; water, salt, and heat budgets; chemical tracer distributions; advection and diffusion. Offered: W.

OCEAN 351 Quantitative Methods I (3) NW Applications of mathematical techniques to problems in the sciences and engineering. Emphasis on formulation, solution, and interpretation of results. Introductory survey of differential equations. Prerequisites: MATH 126. Offered: jointly with AMATH/MATH 351; A.

OCEAN 352 Quantitative Methods II (3) NW Development and application of numerical methods and algorithms to problems in the applied sciences and engineering. Applied linear algebra and introduction to numerical methods. Emphasis on use of conceptual problems in engineering, mathematics, and science. Prerequisites: MATH 126 and any programming language. Offered: jointly with AMATH/MATH 352; W.

OCEAN 353 Quantitative Methods III (3) NW Applications of mathematical techniques to problems in the sciences and engineering. Emphasis on formulation, solution, and interpretation of results. Introductory survey of partial differential equations. Examples in physical and biological sciences and engineering. Prerequisite: AMATH 351 or MATH 307. Offered: jointly with AMATH/MATH 353 Sp.

OCEAN 401, 402 General Physical Oceanography I, II (3,3) NW Physical properties and processes; theories and methods describing ocean currents, waves, and tides. Prerequisites: one year each of

chemistry and physics, 202 for 401, 401 for 402. Offered: A, W.

OCEAN 421 Chemical Oceanography (4) NW Physical and chemical properties of seawater and marine products; processes determining the chemical makeup of the oceans. Prerequisites: 202 and CHEM 140, 150. Offered: Sp.

OCEAN 433 General Biological Oceanography (4) NW Marine organisms, their quantitative distribution in time and space and their interactions with the ocean. Prerequisites: 401 and BIOL 101-102 or BIOL 201, 202, 203. Offered: W.

OCEAN 440 Instrumentation in Oceanography (3-6) NW Introduction to the general principles of instrument design, including discussions of sensors, signal processing, telemetry, and recording from the point of view of the experimental scientist. Laboratory work for variable credit is offered in the form of projects, preferably practical ones resulting in the completion of a small hardware device.

OCEAN 450 Marine Geology and Geophysics (4) NW Sedimentological and petrologic processes that determine the geologic record. Prerequisite: GEOL 205. Offered: A.

OCEAN 451 Marine Geochemistry (3) NW Study of chemical aspects of more abundant minerals in marine sediments, origin or mode of formation, isotopic and chemical composition, rate of deposition, distribution and relative importance in major sedimentary cycle, influence on chemical composition of seawater. Prerequisite: one year of general chemistry.

OCEAN 452 Principles of Sediment Transport by Turbulent Flow (3) NW Theoretical and experimental techniques used in studying erosion, transportation, and deposition of sediment. Initial motion of sediments, bed-load motion, suspension of sediment by turbulent flows, erosion and deposition of sediments, and applications of sediment transport theory to problems of geological interest. Prerequisite: GEOL/GPHYS 455. Offered: jointly with GEOL/GPHYS 452.

OCEAN 480 Oceanic Data Interpretation (5) NW Collection and analysis of marine data. Laboratory analysis of samples, data handling, and modeling of marine problems. Prerequisites: 402, 433, and 450. Offered: Sp.

OCEAN 485 Topics in Oceanography (1-4, max. 5) NW Specialized topics in oceanography. Various techniques in solving oceanographic problems. For students with senior standing. Prerequisite: permission of instructor. Offered: WSp.

OCEAN 499 Undergraduate Research (1-12, max. 24) NW Research on assigned topics that may involve laboratory work, fieldwork, or literature surveys. Prerequisite: permission of instructor. Offered: AWSpS.

Courses for Graduates Only

OCEAN 500 Current Problems in Oceanography (1) Discussion of research topics that are currently being investigated within the school. Prerequisite: permission of instructor. Offered: A.

OCEAN 501 Oceanography of Inshore Waters (3) Theories and techniques of investigation and interpretation of conditions existing in inshore waters with particular reference to mixing and flushing and to areas adjacent to the State of Washington; use of dynamic models. Prerequisite: permission of instructor.

OCEAN 509 Seminar (1) Introduction to current research topics for beginning graduate students. Offered: AWSp.

OCEAN 510 Physics of Ocean Circulation (5) Structure of ocean basins; physical properties of seawater and the equation of state; heat, salt, fresh water budgets; tidal potential; Coriolis effect and geostrophic

balance; major current systems and water masses; mixing, stirring in the ocean; simple waves; modern experimental methods in physical oceanography. Prerequisite: permission of instructor. Offered: A.

OCEAN 511 Physical Fluid Dynamics (3) Fundamentals of fluid mechanics as a basis for understanding problems in geophysical fluid dynamics. Cartesian tensors, derivation of the Navier-Stokes equation, Bernoulli's equation and potential flow, dimensional analyses, introduction to mathematical approximation techniques, flows with rotation, effects of density stratification. For physical oceanography graduate students. Prerequisite: permission of instructor. Offered: A.

OCEAN 512 Geophysical Fluid Dynamics I (3) Large-scale dynamics of rotating stratified fluids, introductory fluid mechanics. Observed properties of oceanic, atmospheric flow, thermal-wind balance, velocity spirals. Potential vorticity, instability of large-scale flows, Ekman layers. Gravity, inertia, Rossby waves; ray theory, equatorial waveguide. Action, energy principles. Offered: jointly with ATM S 509; W.

OCEAN 513 Geophysical Fluid Dynamics II (3) Theories, models of large-scale dynamics of oceans, atmospheres. Potential vorticity, Q principles; Rossby waves, ray tracing, Green's function, setup of general circulation; atmospheric "channels" versus ocean "basins"; wave-mean flow interaction, mountain drag, internal momentum flux; "Lagrangian" motion of particles, tracers; cascades, eddy flux of heat, moisture, Q. Prerequisite: 512. Offered: Sp.

OCEAN 514 Waves (3) Application of marine hydrodynamics principles to wave motion in oceans. Offered: W.

OCEAN 515 Ocean Circulation: Observations (3) Modern large- and mesoscale ocean observations, interpreted in terms of contemporary circulation theories. Spectrum of temporal variability; eddies and eddy fluxes; ventilation; advection and diffusion in the abyss; transports of heat and salt; climatic scale of variability; modern methods for determining circulation. Prerequisite: 510 or permission of instructor. Offered: Sp.

OCEAN 516 Ocean Circulation: Theories (3) Hydrodynamic theories concerning origin and characteristics of major ocean currents. Prerequisite: 512 or permission of instructor. Offered: A.

OCEAN 517 Methods and Measurements in Physical Oceanography (2) Principal instruments and experimental methods of physical oceanography. Devices and systems that measure pressure, temperature, electrical conductivity, sea state, and velocity. Prerequisite: permission of instructor. Offered: alternate years.

OCEAN 519 Seminar in Physical Oceanography (1, max. 9) Discussion of selected problems of current interest in physical oceanography. Prerequisites: 510 or permission of instructor.

OCEAN 520 Marine Chemistry (5) Processes controlling the chemical composition of seawater. Chemical distributions in the ocean, marine physical chemistry, chemical equilibrium, and concepts of mass balance. Mechanisms and models used to explain distributions of stable and radioactive isotopes, gases, trace metals, and biochemicals in the world's oceans. Offered: A.

OCEAN 521 Aquatic Chemistry (3) Application of physical chemistry and thermodynamics to processes that control chemical composition of natural waters. Equilibrium approach. Acid/base chemistry, the carbonate system, dissolution and precipitation, metal ions in solution, oxidation-reduction chemistry, silicate mineral reactions. Prerequisite: 520 or permission of instructor. Offered: W.

OCEAN 522 Marine Organic Geochemistry (3) Sources, reactions, and fates of organic molecules in

the marine environment along with the stable isotope geochemistry of marine organic substances. Prerequisites: CHEM 237 and 239 or permission of instructor.

OCEAN 529 Seminar on Chemical Oceanography (*, max. 9) Lectures, discussions, and readings on selected problems of current interest. Prerequisite: permission of instructor. Offered: AWSp.

OCEAN 530 Biological Oceanography: Bacteria and Protozoa (3) Bacteria in the marine environment; fate of organic carbon in the ocean and the interrelationship of the carbon cycle with other biogeochemical cycles. Prerequisite: permission of instructor. Offered: W.

OCEAN 531 Biological Oceanography: Phytoplankton (3) Phytoplankton in the marine environment: ecology, primary productivity, and physiology. Phytoplankton growth and photosynthetic patterns; spatial and temporal distributions of phytoplankton; methods for determining distributions and rates of production and growth. Prerequisite: permission of instructor. Offered: W.

OCEAN 532 Biological Oceanography: Zooplankton (3) Distribution and abundance of pelagic animals in space and time; analysis of their interactions. Small-scale distributions and behavior, population dynamics and energetics, trophic structure and dynamics, pelagic community structure, models of populations and food chains, secondary production and biogeography. Prerequisite: permission of instructor. Offered: Sp.

OCEAN 533 Biological Oceanography: Benthos (3) Analysis of marine benthic communities; new research questions and method; ecologically important physics of benthic boundary layer; theories, mechanics, and observations of deposit feeding; succession as consequence of physical processes and biological interactions. Environments include deep-sea, continental shelves, estuaries, and intertidal, focusing on soft substrata. Prerequisite: permission of instructor. Offered: Sp.

OCEAN 534 Methods and Measurements in Biological Oceanography (2) Methods for bacteria, phytoplankton, and zooplankton population assessment. Rate measurements of phytoplankton, zooplankton, and bacterial production. Benthos measurements, including deep-sea environments. Prerequisite: permission of instructor. Offered: W.

OCEAN 535 Biological Oceanography for Physical Scientists (5) Principles and practice of biological oceanography for students with strong background in physical sciences but little recent exposure to biology. Ecological principles at individual, population, and community levels; overview of discipline of biological oceanography; case studies of interdisciplinary problems shared with the physical sciences. Prerequisite: permission of instructor. Offered: W.

OCEAN 536 Seminar in Geostatistics (1-3) Lectures and discussions on selected problems in the applications of statistics in earth science. Offered: alternate years.

OCEAN 539 Seminar in Biological Oceanography (*, max. 9) Lectures, discussions, and work on selected problems of current interest. Prerequisite: permission of instructor. Offered: AWSp.

OCEAN 540 Marine Geological Processes (5) Principles of thermodynamics, heat and mass transfer, fluid mechanics, continuum mechanics, and time-series analysis applied to marine geological and geophysical data. Applications to thermal balance of the oceanic lithosphere; Pleistocene sedimentation and global climate change; and sediment transport in high energy environments. Prerequisite: permission of instructor. Offered: W.

OCEAN 541 Marine Sedimentary Processes (5) Erosion, transportation and deposition of sediment in

estuarine, beach, continental shelf and slope, and deep sea environments. Development of equations characterizing boundary shear flows, initiation of grain motion, bedload and suspended load transport. Evolution of primary bed forms, processes of sediment accumulation, and measurement techniques. Prerequisite: permission of instructor. Offered: A.

OCEAN 542 Physics of the Oceanic Lithosphere I (3) Physical processes responsible for the formation and evolution of the oceanic lithosphere. Thermodynamic mechanisms of mantle creep; fluid dynamics of mantle flow, decompressional melting, formation of oceanic crust, and cooling of the oceanic lithosphere. Prerequisites: GPHYS 501 and 504 or permission of instructor. Offered: W.

OCEAN 543 Physics of Oceanic Lithosphere II (3) Physical processes responsible for the formation and evolution of the oceanic lithosphere. Rheology, fault mechanics, plate flexure, marine gravity, the relationship between gravity and topography, magnetic properties of ocean crust, and character of marine magnetic anomalies. Prerequisites: 542 or permission of instructor. Offered: Sp.

OCEAN 544 Geochemical Evolution of Oceanic Lithosphere (3) Chemical principles of magmatic evolution and hydrothermal interaction as they apply to the formation and evolution of the oceanic lithosphere. Comparisons of theoretical models with field studies conducted using submersibles and deep ocean drilling. Prerequisite: permission of instructor. Offered: A.

OCEAN 549 Seminar in Geological and Geophysical Oceanography (*, max. 9) Lectures, discussions, and field and laboratory work on selected problems of current interest. Prerequisite: permission of instructor. Offered: AWSp.

OCEAN 550 Geochemistry and Geophysics of Melt Generation (3) Mantle flow beneath mid-ocean ridges and hotspots, major element systematics, constraints from trace elements and isotopes on melting and mantle reservoirs, melt extraction, and crustal thickness and axial topography. Prerequisite: 544 or permission of instructor. Offered: alternate years.

OCEAN 551 Applied Marine Seismology (3) Practical application of seismic techniques to the study of the ocean basins. Analysis of refraction data, multichannel reflection profiling, surface wave studies, and earthquake analysis. Prerequisite: GPHYS 502 or permission of instructor. Offered: alternate years.

OCEAN 552 Seminar in Geophysics and Geological Data Analysis (1) Practical geophysical data analysis, map projections, gridding multibeam bathymetry processing, gravity and magnetic anomalies, downward continuation, magnetic inversion, seismic refraction and reflection, and microearthquake locations. Prerequisite: permission of instructor.

OCEAN 559 Advanced Seminar on Mid-Ocean Ridge Processes (*, max. 9) Lectures, discussions, and practical work on selected topics of current interest in mid-ocean ridge research. Prerequisite: permission of instructor.

OCEAN 569 Topics in Physical Oceanography (1-4, max. 9) Lecture series on topics of major importance in physical oceanography. Offered: AWSp.

OCEAN 570 Marine Microbial Interactions (3) Structure, function, and dynamics of natural mixed-species populations of marine bacteria and their interactions with higher organisms; mixed-species culture methods; symecological field methods; species assemblages in specialized environments; mutualisms; sites and patterns of genetic exchange. Prerequisite: 530 or permission of instructor. Offered: alternate years.

OCEAN 571 Marine Primary Productivity (3) Patterns and mechanisms of marine phytoplankton primary production. Small-to-global-scale patterns of

production; environmental regulation of production; absorption of electromagnetic radiation; fluorescence; carbon fixation; trophic interactions; remote sensing and other optical methods. Prerequisite: 531 or permission of instructor. Offered: alternate years.

OCEAN 572 Zooplankton Ecology (3) Life history strategies, dynamics and production of populations, vertical migration, interspecific interactions and community structure, models of complex assemblages of zooplankton, sampling methods and analysis, spatial heterogeneity. Prerequisite: 532 or permission of instructor. Offered: alternate years.

OCEAN 573 Benthic Biological Processes (3) Processes characteristic of soft-bottom benthic environments; areas and methods of rapid current progress; open research questions; deposit feeding; passive larval recruitment; physical, chemical, geological, and biological feedbacks in ecological succession; scaling of laboratory systems. Prerequisite: 533 or permission of instructor. Offered: alternate years.

OCEAN 574 Principles and Applications of Molecular Methods (3) *Bentzen* Techniques of molecular analysis with emphasis on DNA methods, including PCR, DNA sequencing, RFLP, RAPD and VNTR analysis and cloning. Applications of these techniques to fisheries, aquaculture, oceanography, population and evolutionary studies, and other areas of science. Prerequisite: permission of instructor. Offered: jointly with FISH 552; A.

OCEAN 575 Molecular Techniques (4) *Bentzen* Laboratory on DNA methods. Experiments analyzing genetic variation at the intra- and interspecific level, including one experiment of student's own design. Techniques include DNA extraction and quantitation, PCR, DNA sequencing, RFLP analysis and cloning. Prerequisite: 542 or permission of instructor. Offered: jointly with FISH 543. Sp.

OCEAN 578 Advanced Topics in Biological Oceanography (*, max. 18) Specialized research areas. Topic varies each year. Offered at Friday Harbor Laboratories. Prerequisite: permission of director of Friday Harbor Laboratories. Offered: S.

OCEAN 580 Aquatic Kinetics (3) Reaction rates and mass transport in water. Theories of chemical kinetics; experimental results from: CO_2 hydrolysis, Fe, Mn, and H_2S oxidation, stable isotope fractionation, mineral dissolution; homogeneous, heterogeneous, microbial catalysis; reaction and transport at air-water, sediment-water, and $\text{O}_2/\text{H}_2\text{S}$ interfaces. Prerequisites: CHEM 524 or equivalent and differential equations. Offered: alternate years.

OCEAN 581 Geochemical Modeling (3) Background to modeling concepts frequently encountered in chemical oceanography: box models, advection-diffusion problems, sediment diagenesis equations, and boundary layer (air-water and sediment-water interface) models. Problems requiring application of the models to chemical distributions in the ocean. Prerequisite: permission of instructor. Offered: alternate years.

OCEAN 582 River Basin Biogeochemistry (3) The function of rivers and river basins in transporting materials to the oceans and their importance in biogeochemical cycles. Origin of water and water routing within drainage basins, sources and modification of dissolved and particulate materials in transport, ecological theory, and estuarine mixing zone transformations. Prerequisite: permission of instructor. Offered: alternate years.

OCEAN 583 Isotope Biogeochemistry (3) The use of stable isotopes to study biogeochemical cycles in the oceans and atmosphere; specifically carbon, nitrogen, and sulfur cycles. Isotopic effects during photosynthesis, respiration, organic matter degradation, CaCO_3 dissolution, methanogenesis, nitrification/denitrification, and sulfate reduction. Prerequisite: permission of instructor. Offered: alternate years.

OCEAN 584 Radiochemical Tracers and Ocean Mixing (3) Distribution of natural and bomb-produced radioactive tracers in the ocean. Application of models used to derive information concerning time scales of (1) gas transfer at the water atmosphere interface; (2) whole ocean, thermocline, and deep-ocean water circulation; and (3) particulate settling in the marine environment. Knowledge of elementary differential equations suggested. Prerequisite: permission of instructor. Offered: alternate years.

OCEAN 585 Paleooceanography (3) History of environmental changes on earth over the past 100 million years as reconstructed from records in deep-sea sediments, ice sheets, and other ocean/terrestrial substrates. Examination of isotopic, geochemical, micropaleontological, and dating techniques. Role of the ocean in climate change. Prerequisite: permission of instructor. Offered: alternate years.

OCEAN 590 Advanced Topics in Oceanography (9-18) Advanced topics examining specialized and interdisciplinary areas of oceanographic research. Offered at Friday Harbor Laboratories. Prerequisite: permission of Director of Friday Harbor Laboratories. Offered: S.

OCEAN 591 Marine Science in the Coastal Zone (4) Major oceanic and nearshore processes, conditions, and their influence on human activities in coastal zone. Methods of understanding and accessing the accumulated knowledge on marine processes and its applications to decision-making process. Lectures and discussions of biological, chemical, geological, and physical oceanography. Generation and use of data bases as interpretative tools. Offered: A.

OCEAN 600 Independent Study or Research (*) Offered: AWSpS.

OCEAN 700 Master's Thesis (*) Offered: AWSpS.

OCEAN 800 Doctoral Dissertation (*) Offered: AWSpS.



School of Pharmacy

Dean

Sidney Nelson

Associate Dean

Wayne A. Kradjan

Nanci L. Murphy, Director,
Academic and Student Programs

The School of Pharmacy prepares students for careers in a variety of settings, including ambulatory practice, institutional practice, long term care, home care, industry, academia, and research. The entry level professional curriculum provides scientific and clinical applications in the following areas of training: the biological sciences (anatomy, physiology, genetics, immunology, microbiology, pathology, biochemistry), the pharmaceutical sciences (dosage formulation, pharmacuetics and biopharmaceutics, medicinal chemistry, pharmacology), the clinical sciences (therapeutics, pharmacokinetics, drug literature evaluation, clinical pharmacology, drug product selection and drug use review), administrative training (business administration, distribution system management, drug distribution and health care delivery systems, formulary management, health care policy, pharmacoeconomics, pharmacoepidemiology, pharmacy law), social and behavioral sciences (communications with patients and other health care providers, a sensitivity to patient concerns, ethics, health promotion and disease prevention), and the technical sciences (computerized data management, medication distribution systems and new technologies in drug administration). Teaching is directed at helping students develop the critical thinking and problem solving skills necessary to provide rational drug therapy, promote healthy lifestyles and disease prevention, enhance patient compliance, reduce medication related problems and improve health outcomes. In the final year of the program, students complete experiential training at community and institutional pharmacies located primarily in the Puget Sound area. Graduates meet the educational requirements for licensure in all fifty states, as the School is fully accredited by the American Council on Pharmaceutical Education.

The School of Pharmacy is organized into Departments of Medicinal Chemistry, Pharmaceutics, and Pharmacy. Information about the entry level professional program may be obtained from the Office of Academic and Student Programs located in H-362 Health Sciences. Graduate school information may be received from the individual departments offering the advanced degrees.

Consideration for admission to the professional program requires a minimum of two years of prepharmacy training. Sequences in biology, general chemistry and organic chemistry as well as courses in calculus, statistics, writing, microbiology, the visual, literary, and performing arts (formerly humanities) and individuals and societies (formerly the social sciences), compose the necessary prerequisite work. An applicant who is admissible to the University is not assured of admission to the School of Pharmacy. Admission is competitive, based on academic achievement, motivation, oral and written communication skills, and aptitude for a pharmacy career. The deadline for submission of applications is February 15. An on-site interview is required as part of the admission process. Further details on admission requirements, application procedures, and program content can be obtained from the Office of Academic and Student Programs.

Students are given an opportunity to use elective choices to design their own program sequence. Specialized professional courses may be taken which prepare a student to provide pharmaceutical care in an area compatible with career goals. The Geriatric Certificate Program which combines didactic and practicum course work addressing the needs of the elderly, is an example of how students can apply their elective choices to pursue an area of interest.

In autumn of 1995, the School of Pharmacy began offering a four-year entry-level program leading to the Doctor of Pharmacy degree. The following descriptions include courses from this program as well as the final year of the Bachelor of Science and the postbaccalaureate Pharm. D. programs. Due to the transitions during this time interval, information is subject to modification. Interested individuals are encouraged to contact the Office of Academic and Student Programs in the School of Pharmacy.

Medicinal Chemistry

Chair

Wendel L. Nelson

Graduate Program

Wendel L. Nelson, Graduate Program Coordinator

The Department of Medicinal Chemistry offers programs of graduate study leading to the degrees of Master of Science and Doctor of Philosophy. The primary areas of research training of the Department of Medicinal Chemistry are in chemical and molecular aspects of drug action and of drug metabolism including both laboratory experiments and theoretical work. Studies in the field include, for example, the relationship between chemical structure and biologic effect, function and toxicity; delineation of the metabolic spectrum of drugs or foreign substances in man and animals, and the factors (environmental, disease, etc.) that affect this spectrum of metabolites; the study of the nature and catalytic properties of the enzymes responsible for metabolic reactions and the molecular mechanisms by which such reactions occur. Theoretical studies on conformational aspects of important enzymes involved in these processes are under study.

Graduates from the program must possess the skills necessary to develop quantitative and qualitative methodologies to pursue studies at the whole animal, organ, microsomal, or purified enzyme level; to elucidate and evaluate the chemical transformations that occur in metabolic processes by isolation, purification, spectroscopic investigation, structural determination, and chemical synthesis; and, ultimately, to provide an understanding and rationale at the molecular level for events that occur at the biological level.

Most students proceed directly to the doctoral degree program. Participation in a cumulative examination process and at least two quarters of teaching experience are additional requirements for the doctoral program. Satisfactory completion of cumulative examination requirements are necessary to work for the Ph.D. degree.

Admission Requirements

Students who intend to work toward the Doctor of Philosophy degree must apply for admission to the Graduate School and meet the requirements outlined in the Graduate Study section of this catalog. Graduate students must satisfy the requirements for an advanced degree in force at the time the degree is to be awarded. Graduate study requires approval of the Graduate School and the Department of Medicinal Chemistry.

Special Requirements

Students with undergraduate degrees in pharmacy or in the biological or physical sciences are accepted for graduate study in medicinal chemistry. Undergraduates who plan to pursue graduate study may expedite their programs by selection of pertinent electives. Although the choice of electives varies with the student's ultimate goals, graduate study in medicinal chemistry requires adequate preparation in mathematics and in the biological and physical sciences.

Master of Science

A student in the master's degree program must present at least 27 credits of course work, exclusive of thesis and nonthesis research. The student also must complete a research project, prepare an acceptable thesis, and pass a final examination.

Doctor of Philosophy

A student in the doctoral program must present a minimum of 45 credits of course work, exclusive of dissertation and nonthesis research. Credits earned for the master's degree may be applied toward the doctoral degree. The student must pass a General Examination for admission to candidacy for the doctoral degree. Satisfactory completion of departmental cumulative examinations precedes scheduling of the General Examination. The student must complete a research project, prepare an acceptable dissertation and pass a Final Examination. Research for the doctoral degree must be done at the UW.

Financial Aid

Financial support in the form of research assistantships and fellowships may be available to students in good standing throughout their graduate careers. Availability of financial support varies from year to year, and prospective applicants should contact the graduate program coordinator for additional information.

Correspondence and Information

Graduate Program Coordinator
H164 Health Sciences

Faculty

Chair

Wendel Nelson

Professors

Baillie, Thomas A. * 1981, (Affiliate); PhD, 1973, University of Glasgow (UK); MSc, 1973, University of London (UK); medicinal chemistry.

Fischer, Louis 1926, (Emeritus); PhD, 1933, Washington University; medicinal chemistry.

Floss, Heinz G. * 1987, (Adjunct); PhD, 1961, Technical University of Munich (Germany); bioorganic and natural products chemistry.

Huitric, Alain C. 1955, (Emeritus); PhD, 1954, University of California (San Francisco); medicinal chemistry.

Krupski, Edward 1983, (Emeritus); PhD, 1949, University of Washington; medicinal chemistry.

McCarthy, Walter * 1949, (Emeritus); PhD, 1949, Indiana University; medicinal chemistry.

Nelson, Sidney D. * 1977; PhD, 1974, University of California (San Francisco); medicinal chemistry, chemical toxicology.

Nelson, Wendel * 1965; PhD, 1965, University of Kansas; medicinal chemistry.

Trager, William F. * 1972; PhD, 1965, University of Washington; medicinal chemistry, bioanalytical chemistry drug metabolism.

Associate Professors

Elmer, Gary W. * 1971; PhD, 1970, Rutgers University; medicinal chemistry.

Kharasch, Evan D. * 1984, (Adjunct); PhD, 1983, MD, 1984, Northwestern University; clinical pharmacology of anesthetic agents, drug metabolism, and drug interactions.

Kunze, Kent * 1989, (Research); PhD, 1981, University of California (San Francisco); medicinal chemistry and drug metabolism.

Rettie, Allan E. * 1984; PhD, 1983, University of Newcastle-On-Tyne (UK); *in vitro* drug metabolism in man.

Assistant Professors

Atkins, William M. * 1991; PhD, 1988, University of Illinois; protein engineering.

Daggett, Valerie D. * 1993; PhD, 1990, University of California (San Francisco); molecular modelling studies of peptides and proteins.

Hackett, Murray 1995; MS, 1987, Oregon State University; PhD, 1991, University of Nevada; biochemical applications of mass spectrometry.

Pharmaceutics**Chair**

René H. Levy

Graduate Program

René H. Levy, Graduate Program Coordinator

The Department of Pharmaceutics offers programs of graduate study leading to the degrees of Master of Science and Doctor of Philosophy.

Program Description

The program provides research training in the fundamental aspects of drug disposition, drug delivery, and drug action in animals and man. Drug disposition includes the phenomena of absorption, distribution, and elimination. Pharmacokinetics is the study of time course of these processes and the time course of pharmacological effects. Drug delivery includes targeting of drugs to tissues or specific cells to improve their therapeutic effect. These areas of research have a wide range of applications, particularly in the pharmacological characterization of new drug molecules in pharmaceutical development. Graduates of this program possess expertise in a variety of analytical techniques and the elaboration of mathematical models to describe drug disposition and pharmacological processes.

During the first two years of study, students take courses in medicinal chemistry, pharmacology, physiology, biochemistry, mathematics, computer science, biostatistics, and pharmacokinetics.

The research program of the department includes six NIH-funded laboratories addressing a variety of fundamental and clinical problems pertaining to drug transport, metabolism, and toxicity associated with several diseases (AIDS, cystic fibrosis, leukemia, epilepsy, pain management, transplantation). Most projects involve collaborative arrangements with investigators from other departments in the University or at the Fred Hutchinson Cancer Research Center. The collaborative relationship of Pharmaceutics faculty with colleagues in the Department of Medicinal Chemistry in the field of drug metabolism has received worldwide recognition.

Thesis research can involve experimental animal work, *in vitro* studies, clinical investigation, or a combination

of approaches. Graduate students are given the opportunity to participate in interdisciplinary research, which provides an added dimension to their training.

A wide range of career paths are available to graduates of this program. Opportunities include research in the pharmaceutical industry; research in hospitals, institutes, and foundations; teaching and research in academic institutions; and positions with government regulatory agencies.

Admission Qualifications

Students with undergraduate degrees in pharmacy, chemistry, or in the biological sciences are accepted for graduate study in pharmaceutics. Undergraduates who plan to pursue graduate study may expedite their programs by selection of pertinent electives. This information can be obtained from the graduate program coordinator.

Financial Aid

All students in the program receive financial support in the form of research assistantships, Public Health Service predoctoral training fellowships and other fellowships such as the William E. Bradley Graduate Fellowship and those from the American Foundation for Pharmaceutical Education.

Correspondence and Information

Graduate Program Coordinator
H272 Health Sciences
Department of Pharmaceutics, Box 357610
Seattle, WA 98195-7610
email: pingpong@u.washington.edu
Phone: (206) 543-9434, FAX: (206) 543-3204

Faculty**Chair**

René H. Levy

Professors

Gibaldi, Milo * 1978; PhD, 1963, Columbia University; critical analysis of literature on drug discovery and development.

Hammarlund, E. Roy * 1960, (Emeritus); PhD, 1951, University of Washington; pharmaceutics.

Levy, René H. * 1970; PhD, 1970, University of California (San Francisco); metabolic interactions among antiepileptic drugs and between cytokines and drugs.

Shen, Danny D. * 1984; PhD, 1975, State University of New York (Buffalo); CNS pharmacokinetics and pharmacodynamics of opioid analgesics and anticonvulsants.

Slattery, John T. * 1978; PhD, 1978, State University of New York (Buffalo); pharmacokinetics/pharmacodynamics of alkylating agents, oncology/bone marrow transplant/gene therapy.

Associate Professors

Anderson, Gall 1981; PhD, 1987, University of Washington; clinical pharmacokinetics and epilepsy.

Bowdle, T. Andrew 1981, (Adjunct); MD, 1980, PhD, 1983, University of Washington; anesthesiology.

Kunze, Kent * 1989, (Adjunct Research); PhD, 1981, University of California (San Francisco); medicinal chemistry and drug metabolism.

Thummel, Kenneth E. (Research); 1989, PhD, 1987, University of Washington; regulation of cytochrome P-450 expression in transplantation, diabetes and morbid obesity.

Unadkat, Jashvant D. * 1985; PhD, 1982, University of Manchester (UK); mechanisms of transport of anti-HIV drugs across placenta, CSF-blood barrier, and intestine.

Assistant Professor

Ho, Rodney J. Y. * 1990; PhD, 1987, University of Tennessee; maternal-fetal-transmission of HIV.

Lecturer

Witek, Donald J. 1991; BS, 1987, University of Washington; pharmacy.

Pharmacy**Chair**

Andy Stergachis

Graduate Program**Master of Public Health**

Students can earn the Master of Public Health (M.P.H.) or Master of Health Administration (M.H.A.) degree through a collaborative program with the School of Public Health and Community Medicine.

Enrollment is competitive. Applications for admission to the M.P.H. and M.H.A. programs should be made in January of each year for autumn quarter enrollment. Additional information is available from Dr. Dale Christensen, Department of Pharmacy, or from the offices of each respective program in the School of Public Health.

The Program in Pharmaceutical Outcomes Research and Policy was established to provide a focus for academic activities concerning the relationship between medications, medical care, and health outcomes. In collaboration with the School of Public Health, the program offers graduate training in pharmacoepidemiology, the study of the use and effects of drugs in large defined populations, pharmacoconomics, and drug policy. The core faculty for the program is drawn from the disciplines of pharmacy, epidemiology, medicine, health services, and biostatistics. Strong linkages have been established with many public and private health care organizations in the Northwest. For further information and application material contact Dr. Andy Stergachis.

Faculty**Chair**

Andy Stergachis

Professors

Burkhart, Vincent D. 1982; MS, 1972, University of Maryland; institutional pharmacy practice and fiscal and personnel management.

Gibaldi, Milo * 1978, (Adjunct); PhD, 1963, Columbia University; critical analysis of literature on drug discovery and development.

Hall, Nathan A. * 1951, (Emeritus); PhD, 1948, University of Washington; pharmacy practice.

Hansten, Philip D. 1989; PharmD, 1968, University of California (San Francisco); drug interactions.

Horn, John 1978; PharmD, 1977, University of Cincinnati; therapeutics.

Kradjan, Wayne A. * 1971; PharmD, 1970, University of California (San Francisco); adult general medicine.

Orr, Jack E. 1956, (Emeritus); PhD, 1943, University of Wisconsin; pharmacy history.

Plein, Joy B. * 1966; PhD, 1956, University of Washington; geriatric pharmacotherapeutics, long-term care.

Stergachis, Andy * 1989; PhD, 1979, University of Minnesota; pharmacoepidemiology, pharmacy administration.

Associate Professors

Anderson, Gail 1981; PhD, 1987, University of Washington; clinical pharmacokinetics and epilepsy.

Bauer, Larry * 1980; PharmD, 1980, University of Kentucky; clinical pharmacokinetics and drug metabolism, drug interactions.

Black, Douglas J. 1981; PharmD, 1983, University of Washington; infectious diseases.

Christensen, Dale B. * 1976; PhD, 1977, University of Minnesota; pharmacy administration.

Edwards, W. A. Drew 1982, (Clinical); MS, 1971, University of Wisconsin; gastrointestinal diseases, nutrition.

Ellsworth, Allan J. 1981; PharmD, 1977, Philadelphia College of Pharmacy and Science; primary care, family medicine.

Gardner, Jacqueline S. 1990; PhD, 1980, University of Washington; pharmacoepidemiology, drug policy, pharmacy administration.

Hebert, Mary F. 1996; PharmD, 1987, University of California (San Francisco); transplantation, immunology pharmacotherapeutics.

Lippert, Michaelene 1990, (Clinical); BS, 1970, University of Wisconsin; substance abuse, community health care.

Somani, Shabir M. 1994, (Affiliate); MS, 1982, MBA, 1992, University of Minnesota; hospital pharmacy administration.

Assistant Professors

Davis, Paul W. 1983, (Clinical); PhD, 1966, University of Michigan; pharmacy administration, clinical pharmacy, pharmacotherapeutics.

Gray, Shelly L. 1995; PharmD, 1989, University of Michigan; geriatric pharmacy.

Heckbert, Susan R. * 1990, (Adjunct); MD, 1981, Case Western Reserve University; MPH, 1987, PhD, 1990, University of Washington; outcomes of drug therapy, susceptibility to cancers.

Lessler, Daniel 1990, (Adjunct); MD, 1986, Stanford University; MHA, 1992, University of Washington; physician management and decision-making, pharmacoconomics.

Osborn, Teresa McRorie 1987; PharmD, 1987, University of Utah; pediatric pharmacotherapy, newborn intensive care.

Ritchie, Craig A. 1995, (Affiliate); BPharm, 1968, Washington State University, JD, 1972, University of Idaho; pharmacy law.

Sullivan, Sean * 1992; PhD, 1992, University of California (Berkeley); pharmacoconomics.

Williams, Donald H. 1995, (Affiliate); BPharm, 1958, Massachusetts College of Pharmacy; pharmacy law.

Senior Lecturer

Dawson, Karan N. 1976; MS, 1978, University of Washington; psychotropics, geriatrics, teaching methods.

Lecturer

O'Sullivan, Teresa 1990; PharmD, 1990, University of Minnesota; cystic fibrosis, general medicine, practice-related education, medical literature evaluation.

For prerequisite information on Pharmacy courses, contact the Office of Academic and Student Programs in the School of Pharmacy.

Medicinal Chemistry

MEDCH 400 Fundamental Concepts in Medicinal Chemistry (3) *Trager* Principles of physical organic chemistry; chemical bonding, stereochemistry, acids/bases, and reaction mechanisms relevant to processes such as drug distribution, specificity, and metabolism. Prerequisite: CHEM 239. Offered: Sp.

MEDCH 401 Immunizing and Antimicrobial Agents (4) *Daggett, Elmer* Chemical and biologic properties of agents used to prevent or treat infectious diseases, including diagnostic, prophylactic, and therapeutic uses of immunizing biologicals and spectrum, action mechanisms, resistance patterns, toxicity, and therapeutic applications of antibiotics, antifungals, and antivirals. Prerequisites: MICROM 301, 302, Pharm D. major or permission of instructor. Offered: Sp.

MEDCH 402, 403, 404 Medicinal Chemistry (3, 3, 4) *Atkins, Daggett, Elmer, Hackett, S. Nelson, W. Nelson, Rettie, Trager* Study of the various classes of medicinal compounds with particular emphasis on biological activity, mechanism of action, biotransformation, and the structural and physical properties governing absorption, distribution, and excretion. Prerequisites: CHEM 239 and CONJ-342. Offered: A, W, Sp.

MEDCH 435 Diagnostic Medicinal Chemistry (3) *S. Nelson* Examination of clinical diagnostic tests with regard to the chemical or biochemical rationale of the testing method, interpretation of test results, and major factors influencing test values with special emphasis on the effects of medications. Clinical laboratory data from patients considered in light of these factors. Prerequisite: BIOC 406. Offered: W.

MEDCH 490 Metabolism of Drugs (3) *Trager* Processes of drug metabolism, their mechanisms, and their implications in modern therapy. Bioactivation of prodrugs and biotransformations in the inactivation and elimination of drugs, and the relationship to drug toxicity and drug design. Prerequisite: CHEM 239 or equivalent. Offered: W.

MEDCH 495 Special Studies in Medicinal Chemistry (* max 6) Opportunity to expand the breadth and depth of understanding in specific areas. Credit/no credit only. Prerequisite: permission of instructor. Offered: AWSpS.

MEDCH 499 Independent Study/Research (*, max. 6) Research problems in medicinal chemistry. Prerequisites: cumulative grade-point average of 2.50 and permission of instructor. Entry code required. Offered: AWSpS.

Courses for Graduate Students

MEDCH 501, 502, 503 Advanced Medicinal Chemistry (4,4,4) *Atkins, Daggett, Elmer, Kunze, W. Nelson, Rettie, Trager* Advanced study of the various classes of medicinal compounds, with particular emphasis on biological activity, mechanism of action, biotransformation, and the structural and physical properties governing absorption, distribution, and excretion. Prerequisite: permission of instructor. Offered: AWSp.

MEDCH 520 Seminar (1, max. 5) Graduate students attend seminars and make one formal presentation per year while in residence; 1 credit per year is allowed. Credit/no credit only. Offered: jointly with PCEUT 520; AWSp.

MEDCH 521 Advanced Medicinal Chemistry (3) Application of integrated data from the physical and biological sciences to problems of chemotherapy, including transport of drugs to site of action, biotransformation of drugs, interaction of drugs with enzyme systems, and recent advances in drug design. Prereq-

uisites: CHEM 457, 531, and BIOC 442, or permission of instructor. Offered: Sp.

MEDCH 525 Laboratory Methods in Drug Metabolism (3) *Atkins, Daggett, Kunze, Rettie, Thummel* Examines laboratory techniques for the isolation and characterization of subcellular fractions from human tissues. Includes the determination of product formation kinetics, in vitro-in vivo kinetic scaling, quantitation of specific enzyme contents in human tissue, and computer-assisted prediction of metabolites of catalytically sensitive drugs. Offered: jointly with PCEUT 525; A.

MEDCH 527 Drug Metabolism (3) *Rettie* Considerations of the biochemical mechanisms for the biotransformation of drugs and foreign compounds. Includes reaction mechanisms, ultrastructural considerations, induction mechanisms, methodology, kinetics of inhibition and activation, steroid and amine metabolism. Offered: jointly with PHCOL 527; odd years; W.

MEDCH 528 Proteins in Therapy and Disease (3) *Atkins, Daggett* Examination of enzyme catalysis and of protein structure and dynamics. Principles applied to topics of therapeutic relevance including: peptides and proteins as drugs, structure-based drug design, drug metabolism, protein engineering, and role of mutant or incorrectly folded proteins in disease states. Prerequisite: comprehensive course in biochemistry or consent of instructor. Offered: even years; W.

MEDCH 541 Mass Spectrometry in Life Sciences (3) *Hackett, Howald* Principles of modern mass spectrometry. Applications to problems in chemical, biological, and health sciences. Applications of mass spectrometric techniques to the structural determination and quantitative measurement of biologically important substances. Prerequisite: permission of instructor. Offered: jointly with CHEM 541; even years; Sp.

MEDCH 582 Topics in Medicinal Chemistry (1, max. 10) Discussion of pertinent articles from current literature. Credit/no credit only. Offered: AWSp.

MEDCH 600 Independent Study or Research (*) Credit/no credit only. Offered: AWSpS.

MEDCH 700 Master's Thesis (*) Credit/no credit only. Offered: AWSpS.

MEDCH 800 Doctoral Dissertation (*) Credit/no credit only. Offered: AWSpS.

Pharmaceutics

PCEUT 331 General and Physical Principles (4) *Unadkat, Witet* Introduction to scientific bases of pharmacy, with emphasis on physical processes important in the manufacture, stability, and characteristics of various drug dosage forms. Prerequisites: Pharm D. student. Offered: A.

PCEUT 405 Clinical Pharmacokinetics (5) *G. Anderson, Levy* Basic principles of pharmacokinetics and their application to the clinical setting, including: single-dose intravenous and oral kinetics, multiple dosing, nonlinear pharmacokinetics, role of disease in drug clearance and dose requirements, and kinetics of drug-drug interactions. Prerequisites: 331, Pharm D. student or permission of instructor. Offered: W.

PCEUT 406 Biopharmaceutics and Drug Delivery (4) *Ho, Shen, Slattery* Principles and assessment of drug product bioavailability and bioequivalence, drug-drug and food-drug interactions for orally administered drugs, drug delivery via non-oral routes and the systemic delivery of biotechnology drugs. Prerequisites: 405, Pharm D. student, or permission of instructor. Offered: Sp.

PCEUT 410 Pharmacokinetics of Drug Interactions (3) *Levy, Shen, Slattery, Thummel, Unadkat* The common pharmacokinetic mechanisms underlying clinically important interactions between drugs. Interactions involving gastrointestinal absorption, se-

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

rum drug protein binding, excretory and metabolic clearance processes. Prerequisite: 406.

PCEUT 488 Pharmaceutical Biotechnology (3) *Gibaldi, Ho, Thummel* Applications of biotechnology in designing therapeutic products, with emphasis on research and development of biopharmaceuticals. Molecular cloning, production, physical stability, delivery systems of protein therapeutics in relation to pharmacokinetic and therapeutic responses. Prerequisite: 406, BIOC 405/406 or permission of instructor; . Offered: A.

PCEUT 499 Independent Study/Research (*, max. 6) Basic and clinical research problems in drug disposition and effect. Prerequisites: 2.5 GPA and permission of instructor. Offered: AWSpS.

Courses for Graduate Students

PCEUT 501 Advanced Pharmacokinetics I (3) *Ho, Shen, Thummel, Unadkat* Drug absorption, distribution, excretion, metabolism, and effects in mammalian systems. Compartmental model and model-independent approaches examined. Drug disposition is studied in a physiologically realistic context taking nonlinear events into account. Aimed at development of innovative methods for data analysis and evaluation in biological systems. Prerequisite: 406, 506 or permission of instructor. Offered: Sp.

PCEUT 502 Advanced Pharmacokinetics Concepts (5) *Levy, Shen, Slattery, Unadkat* Recent developments and emerging concepts in theoretical and experimental pharmacokinetics. Critical analysis of the current literature. Prerequisite: 406, 506 or permission of instructor. Offered: Sp.

PCEUT 506 Pharmacokinetic Principles (4) *Ho, Levy, Shen, Slattery, Thummel, Unadkat* Coverage of basic pharmacokinetic concepts in an interactive format. Students are given reading assignments prior to class as a point of entry into the material. Topics emphasize the physiologic basis for mathematical models of drug distribution, clearance, and pharmacologic effect. Offered: W.

PCEUT 507 Drug Therapy Discussion Group (1, max. 12) *Gibaldi* New and important findings and trends in pharmacokinetics, biopharmaceutics, drug metabolism, and drug toxicity, with particular emphasis on clinical significance and applicability. Credit/no credit only. Offered: AWSp.

PCEUT 508 Drug Discovery and Development (2) *Gardner, Gibaldi, Nelson, Shen* Overview of steps that lead to the introduction of new pharmacologic agents for the treatment of disease. Included are the scientific underpinnings of drug discovery, preclinical evaluation, clinical trials, regulatory considerations, and outcomes research. Prerequisite: Pharm D. student, graduate student, or permission of instructor. Offered: A.

PCEUT 510 Pharmacokinetics of Drug Interactions (3) *Levy, Shen, Slattery, Thummel, Unadkat* Common pharmacokinetic mechanisms underlying the clinically important interactions between drugs. Interactions involving gastrointestinal absorption, serum drug protein binding, excretory and metabolic clearance processes. Prerequisite: 406 or equivalent.

PCEUT 520 Seminar (1, max. 5) Graduate students attend seminars and make one formal presentation per year while in residence; 1 credit per year is allowed. Credit/no credit only. Offered: jointly with MEDCH 520; AWSpS.

PCEUT 525 Laboratory Methods in Drug Metabolism (3) *Atkins, Daggett, Kunze, Rettie, Thummel* Examines laboratory techniques for the isolation and characterization of subcellular fractions from human tissues. Includes the determination of product formation kinetics, in vitro-in vivo kinetic scaling, quantitation of specific enzyme contents in human tissue, and computer-assisted prediction of metabo-

lites of catalytically sensitive drugs. Offered: jointly with MEDCH 525; even years; A.

PCEUT 534 Pharmaceutical Analysis (3) *Slattery* Methods of drug and metabolite analysis from biologic matrices. Emphasis on practical aspects of assay design, optimization, and validation. Approaches to troubleshooting both assay methodology and instrumentation problems are also covered. Credit/no credit only. Offered: W.

PCEUT 583 Topics in Pharmaceutics (1, max. 15) Discussion of pertinent articles from current literature and recent laboratory results. Credit/no credit only. Offered: AWSp.

PCEUT 586 Pharmaceutical Biotechnology (3) *Gibaldi, Ho, Thummel* Applications of biotechnology in designing therapeutic products, with emphasis on research and development of biopharmaceuticals. Molecular cloning, production, physical stability, delivery systems of protein therapeutics in relation to pharmacokinetic and therapeutic responses. Prerequisite: 406, BIOC 405/406 or permission of instructor. Offered: A.

PCEUT 600 Independent Study or Research (*) Credit/no credit only. Offered: AWSpS.

PCEUT 700 Master's Thesis (*) Credit/no credit only. Offered: AWSpS.

PCEUT 800 Doctoral Dissertation (*) Credit/no credit only. Offered: AWSpS.

Pharmacy

PHARM 304 Profession of Pharmacy (3) *Kradjan* Overview of the profession of pharmacy emphasizing practice opportunities and specialization. Introduction to clinical and ethics case evaluation techniques using the Pharmacist's Workup of Drug Therapy format. Off site pharmacy visitation required. Credit/no credit only.

PHARM 305 Clinical Dispensing Pharmacy (1-3) *Davis* Preparation and dispensing of prescriptions at Rubenstein Memorial Pharmacy in Hall Health Center or University of Washington Medical Center outpatient pharmacy. For students with little or no experience in pharmacy wishing experience prior to internship, externship, or didactic course work. Under direct supervision of the Student Health Center pharmacists and University of Washington Medical Center pharmacists. Credit/no credit only.

PHARM 309 Quantitative Methods I (3) *Murri, O'Sullivan, Stergachis* Instruction in methods essential for conducting pharmacy calculations, interpreting and evaluating data and literature related to pharmacy, and responding to drug information inquiries from health professionals and patients. Introduction to statistical concepts necessary for pharmacy course work.

PHARM 334 Dispensing Practice Laboratory (2) *O'Sullivan* Didactic material presented that relates to the preparation and dispensing of prescription medications. Laboratory exercises in intravenous admixture, drug administration, patient counseling, use of computers for dispensing, and patient profiles.

PHARM 335 Dispensing Practicum (2/4) *O'Sullivan* Under preceptor supervision, students master competencies necessary for distributional responsibilities in the institutional and ambulatory care pharmacy practice settings.

PHARM 409 Applied Pharmacokinetics (2) *Anderson, Bauer* Pharmacokinetics of specific drugs. Influence of age, weight, sex, and disease states on patient-specific dosage regimens emphasized. Advanced kinetic concepts discussed and put into applied context.

PHARM 411 Medical Devices for Home Health Care (3) *Samani* Study of medical devices commonly provided by pharmacists to their patients, including their selection and adaptation for specific pa-

tient needs. Lectures include display and demonstration of actual devices.

PHARM 412 Nonprescription Drugs and Self-Care (3) *Kradjan* Overview of common classes of non-prescription medications with emphasis on case examples. Patient assessment, non-drug therapy, selection of nonprescription products if appropriate, and advice to patients. Oral presentation required.

PHARM 415 Primary Care Pharmacotherapeutics (3) *Belzia* Explores clinical applications and therapeutic issues for selected drug categories commonly used in primary care settings and across age groups. Selected drug categories are defined by pharmacokinetics, indications for use, efficacy, therapeutic and adverse effects, monitoring parameters, dosing principles, common drug interactions. Patient education and socioeconomic and behavioral factors emphasized.

PHARM 437 Substance Abuse Awareness (3) *Lippert* The etiology and patterns of substance abuse, drug classes, treatment options, codependency and recovery, drug testing, legal and ethical considerations, and community resources are covered in a lecture-discussion format. Students also participate in community service lectures and/or special projects. Credit/no credit only.

PHARM 438 Gerontological Communication Skills Seminar (2) *Dawson* Addresses special communication needs of the elderly, ranging from individualized patient counseling to patient advocacy through development and provision of pharmacy services. Communication techniques applicable to teaching, developing innovative services, supervising, motivating, conflict resolution, and interdisciplinary interactions are explored in lecture and laboratory. Credit/no credit only.

PHARM 440 Pharmaceutical Care Systems I (6) *Dawson* Distribution and control systems for medications and influence of behavior and communications on use. Emphasis on interpreting orders, monitoring patient use, undertaking medication history interviews, and communicating with patients and health professionals using effective listening, writing, and interpersonal skills.

PHARM 441 Pharmaceutical Care Systems II (4) *Gardner* Relationship of pharmaceutical care system to health care in United States. Role of organizations, institutions, public policy in delivery of care. Methods of analyzing medication use in patient populations. Contemporary health issues including access to care, cost containment, quality assurance, and national health insurance.

PHARM 445 Public Health Applications in Pharmacy I (3) *Gardner* Provides skills and knowledge required to administer immunizations and administer and interpret tuberculin skin tests in ambulatory pharmacy practice and to initiate outreach activities in response to assessed community needs for medication-related information and services.

PHARM 450 Pharmacy Laws (3) *Ritchie, Williams* Study of the laws regulating the practice of pharmacy. Includes professional liability, warranties, and contracts. Case studies of ethical considerations of pharmacy practice.

PHARM 452 Contemporary Problems (1) *Christensen* Discussion of current trends affecting the role of pharmacy in health-care delivery. Credit/no credit only.

PHARM 480 Principles of Professional Practice Management (3) *Christensen* Topics include organization of time and objectives, management of financial resources, inventory, and computer simulations of management decision-making. Emphasis on developing specific skills, such as burden rate analysis, and financial ratio analysis. Primarily for students who are

interested in managerial careers in community pharmacy practice.

PHARM 462 Drug Use Review (3) *Christensen* Introduction to purpose, principles, and techniques of utilization review. Emphasis on steps in drug use review process, including criteria development, data collection, analysis, and interventions. Examples of drug use review and evaluation activities in variety of practice settings, including hospitals, nursing homes, and ambulatory care pharmacy networks. Guest speakers.

PHARM 468 Case Studies in Pharmaceutical Care (3, max. 9) *Dawson* Small groups of students work with an instructor to review cases illustrating various aspects of specific diseases: pathophysiology, clinical features, psychosocial factors, therapeutic interventions with emphasis on drug therapies, and community resources. Analytic reasoning, self-study skills, and knowledge are emphasized.

PHARM 470 Community Practicum (8) *O'Sullivan* Closely supervised study-experience periods in community pharmacies. Students participate in active community pharmacy under the supervision of clinical preceptor. Conferences on selected topics supplement work experience. Credit/no credit only.

PHARM 471 Institutional Distributive Practicum (4) *O'Sullivan* Closely supervised study-experience periods in hospital or other institutional pharmacies. Students participate in active institutional pharmacy under supervision of clinical preceptor. Conferences on selected topics supplement work experience. Credit/no credit only.

PHARM 479 Quantitative Methods II (4) *Christensen, Gardner, Stergachis, Sullivan* Introduction to basic statistical and research design concepts in the field of pharmacy. Prerequisite: 309.

PHARM 483 Institutional and Healthcare Systems Pharmacy Practice (2) *Burkhart* Presentation of topics regarding current contemporary institutions pharmacy practice. Discussion of new systems technology, home care programs, managed care, computer applications, budgeting, formulary systems, drug information services, intravenous admixture programs, quality assurance process, and patient oriented services.

PHARM 485 Clinical Therapeutics II (3) *McRorie* Continuation of 484 with emphasis on disease states and their drug therapies. Lectures stress assessment of drug therapy and application of basic pharmaceutical sciences to selection of drugs in patient care.

PHARM 486 Institutional Clinical Practicum (4) *O'Sullivan* Supervised experience in the clinical roles of pharmacy practice. Students participate in daily rounds in institutional patient-care facilities, take drug-use histories, monitor drug therapy of patients, instruct patients about medications, and provide consultation to other health-care professionals. Credit/no credit only.

PHARM 487 Advanced Clinical Practicum (4) *O'Sullivan* Supervised experience in the clinical roles of pharmacy practice. Students provide pharmaceutical care under the supervision of a preceptor in an affiliated health care setting. Students may provide consultation to other health care professionals in ambulatory or institutional patient care facilities. Credit/no credit only.

PHARM 488 Elective Advanced Practicum (1-16, max. 32) *O'Sullivan, Plein* Advanced-level clinical pharmacy experience in institutional (hospital, nursing home, long-term-care facility) and ambulatory patient-care facilities under direct supervision of a clinical preceptor. Credit/no credit only.

PHARM 489 Drug Information (4-8) *Murri* Supervised experience in performing clinical pharmacy activities relating to retrieval and analysis of drug information from various resources; preparation of re-

sponses to consultation requests presented to Drug Information Service; techniques of preparing written and verbal drug information reports; participation in preparation of a pharmacy newsletter. Credit/no credit only.

PHARM 490 Fluid and Electrolytes and Parenteral Nutrition (2) *Edwards* Principles of fluid and electrolyte therapy, including saline, water, and acid-base balance. Carbohydrate, protein, lipid, vitamin, and mineral requirements in parenteral nutrition. Nutritional assessment, complications of parenteral nutrition, stability and compatibility of intravenous solutions, modifications of parenteral nutrition in pediatrics and specific disease states.

PHARM 491 Cancer Pharmacotherapeutics (2) *Kwok, McDonnell, Takeuchi* Pharmacotherapy of cancer, covering supportive care (antibiotics, antiemetics, analgesics, nutrition) to the antineoplastic agents themselves. Specialists in each area serve as guest lecturers.

PHARM 492 Pharmaceutical Services for Long-Term Care (2) *Morrissey* Scope of pharmaceutical services for long-term care (LTC) and systems for services. Responsibilities of the pharmacist for distributive, administrative, and clinical pharmacy services for nursing homes and other long-term-care facilities. Economic considerations in provision of LTC pharmaceutical services, role of the consultant pharmacist for home-health-care organizations. Pharmaceutical services for independently living elderly.

PHARM 493 Medical Literature Evaluation (2) Introduction to steps involved in the assessment of primary and other literature sources. Students required to read and critique medical literature. Classes conducted in journal club format. Prerequisite: 309.

PHARM 495 Special Studies in Pharmacy (*, max. 6) Special studies of professional topics in pharmacy. An opportunity to expand the breadth and depth of understanding in specific pharmaceutical areas. Students usually undertake independent study under the individual direction of a faculty member.

PHARM 496 Seminars in Pediatric Pharmacotherapy (2) *McRorie* Overview of drug disposition and medication utilization as it applies to the pediatric patient. Specific emphasis on neonatology and ambulatory pediatrics.

PHARM 497 Drug Therapy for the Elderly (4) *Plein* Current knowledge of effects of aging on clinical use of drugs for elderly and aged patients. Drugs of choice and drug therapy monitoring. Multiple drug regimens in treatment of multiple pathologies.

PHARM 498 Case Conference: Geriatrics (1) *Plein* Students taking geriatric pharmacy clerkships in various clinical settings meet with faculty to present case studies of elderly patients requiring complex drug therapies. Credit/no credit only.

PHARM 499 Independent Study/Research (*, max. 6) Applied pharmaceutical research problems. Credit/no credit only.

PHARM 506 Clinical Pharmacokinetics II (3) *Bauer* Discussions based on research papers from clinical kinetic and therapeutic literature regarding the pharmacokinetics of a drug or class of drugs. Presentation of original research proposal required. Credit/no credit only.

PHARM 509 Medical Literature Evaluation (2) *Gardner, Gibaldi, Odegard, O'Sullivan* Introduction to process involved in the assessment of primary and other types of medical literature. Students are required to read and critique medical literature. Classes are conducted in a journal club format.

PHARM 520 Seminar (1, max. 5) *Murri* Doctor of Pharmacy student seminar. Students present two seminars on therapeutic topics of their choosing each year. Credit/no credit only.

PHARM 530 Seminar: Research Methods in Pharmacy Practice (3) *Christensen, Gardner, Stergachis* Research methods and protocols designed to help develop skills in preparing research proposals and conducting applied research in pharmacy. Selected research methods, sources of data, analysis designs, and statistical methodologies. Prerequisites: graduate standing in pharmacy and one statistics course or permission of instructor.

PHARM 533 Pharmacoeconomics (2) *Gardner, Stergachis* Introduction to the study of the risks and benefits of pharmaceuticals. Overview of drug development and approval, assessment of methods for study of drug risks and benefits, and their relationship with the formulation of public policy. Credit/no credit only.

PHARM 534 Medical Technology Assessment (3) *Sullivan* Discussion of economic evaluation techniques for the assessment of medical technologies. Focus on cost-effectiveness and cost-utility analyses, decision analysis, and economic model building for the purpose of resource allocation decisions. Entry code required. Prerequisite: permission of instructor. Offered: jointly with HSERV 584.

PHARM 542 Pharmaceutical Care Systems III (4) *Christensen* Introduction to management concepts, particularly as applied to drug benefit plans, pharmaceutical care services in managed care delivery systems. Management decision-making tools and techniques are presented. Students are professed experience in the application of management decision-making techniques through group case-studies using a problem solving format.

PHARM 550 Pharmacotherapeutics for Older Adults (4) *Plein* Clinical use of drugs for older adults. Age-related pharmacokinetics, pharmacodynamics, and pharmacotherapeutics as applied to selecting and monitoring drug regimens for elderly patients. Problem solving regarding drugs of choice for older people with multiple pathologies. Open to Doctor of Pharmacy student or permission of instructor.

PHARM 560 Therapeutics I (10) *Hansten, Kradjan, McRorie* Clinical application of drug knowledge in the treatment of disease. Emphasis on problem-solving, using case examples.

PHARM 561 Therapeutics II (9) *Black, Gray, Horn* Clinical application of drug knowledge in the treatment of disease. Emphasis on problem-solving, using case examples.

PHARM 562 Therapeutics III (9) *Anderson, Ellsworth, Gray, Kwok* Clinical application of drug knowledge in the treatment of disease. Emphasis on problem-solving, using case examples.

PHARM 574 Clinical Introductory Practicum (1) *O'Sullivan* Students spend three days in a patient care setting, under the guidance of preceptors or advanced students, as an introduction to the practicum experience. Credit/no credit only.

PHARM 575 Institutional Clinical Practicum (5, max. 15) *O'Sullivan* Under faculty supervision, students provide pharmaceutical care in an inpatient environment. Credit/no credit only.

PHARM 576 Ambulatory Care Clinical Practicum (5, max. 15) *O'Sullivan* Under faculty supervision, students provide pharmaceutical care in an outpatient environment. Credit/no credit only.

PHARM 577 Advanced Practicum (5, max. 15) *O'Sullivan* Under faculty supervision, students gain experience in experiential settings of their choice. Credit/no credit only.

PHARM 586 Pharmacotherapy Literature Evaluation and Case Conferences (1-2) *Horn, Kradjan* Weekly pharmacotherapy literature evaluation or case presentation conferences emphasizing current ther-

peutics and clinical decision making. Credit/no credit only.

PHARM 587 Advanced Clinical Clerkship (1-15, max. 60) *Horn* Under faculty supervision, students participate in medical and pharmacy patient rounds in

hospitals or long-term-care facilities, monitor drug therapy, instruct patients concerning proper use of medications, and provide drug consultation to other health-care providers. Credit/no credit only.

PHARM 598 Topics in Pharmacoepidemiology and Drug Policy (2-4) *Stergachis, Sullivan*

Directed individual study of contemporary literature and issues in pharmacoepidemiology, pharmacoeconomics, and drug policy. Credit/no credit only.

PHARM 600 Independent Study or Research (*) Credit/no credit only.



Graduate School of Public Affairs

Dean

Margaret T. Gordon
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The Graduate School of Public Affairs (GSPA) is a graduate professional school providing education and research for the public service. The School confers the Master of Public Administration (M.P.A.) degree with day and evening program options. GSPA's program of study is designed to train highly-skilled managers and policy analysts for a wide range of careers in the public and nonprofit sectors. The academic and professional orientation of the degree program gives GSPA students the knowledge and skills necessary to make significant contributions to regional, national, and international policy. Graduates hold such leadership positions throughout the public sector as mayors and city managers; local and regional government administrators; foreign service officers; staff assistants to elected officials; analysts with budget offices, legislative staff units, and city councils; directors of social service agencies; and administrators of arts organizations. In addition, a number of alumni are employed in the private sector, usually in positions involving substantial contact with public agencies.

Graduate Program

Master of Public Administration

Day Program

The Master of Public Administration degree is awarded upon satisfactory completion of 60 credits of course work, including a final degree project. Students without substantial prior experience in public service work also are expected to complete a paid administrative internship. The program normally requires two full academic years, and, for those requiring an internship, the intervening summer. Students may attend the day program on a part-time basis. Foreign-language proficiency or a thesis are not required for the M.P.A. degree. Concurrent degree programs in International Studies (M.P.A.-M.A.I.S.) and Law (M.P.A.-J.D.) are available.

The GSPA curriculum ensures the integration of public policy analysis and management while giving students the flexibility to specialize in substantive policy fields. Courses emphasize the practical application of the theory, values, and techniques needed to succeed in public life. The academic program is divided into three major components: 1) the required core curriculum, which introduces students to public organization theory; policy analysis; budgeting; microeconomic analysis; and quantitative methods; 2) more concentrated study in economic policy analysis, management, and context and values of public life; and 3) specialized study in one of six policy gateways: education and social policy; environmental policy and natural resources management; international affairs; nonprofit management; urban and regional affairs; or individualized policy study. The policy gateways permit students to explore a wide range of academic disciplines and professional opportunities. Central to the gateways are courses offered by numerous other schools and departments at the University of Washington.

Midcareer Evening Program

GSPA offers an evening degree option for midcareer professionals pursuing the M.P.A. degree. The evening degree program blends academic and professional perspectives to provide public and nonprofit practitioners with the tools to lead their organizations in an effective and responsive fashion.

To receive the evening M.P.A. degree, students will complete 54 credits of course work over a three-year period. Students will take, on average, two 3-credit courses per term, though they will be able to reduce their academic year course load by enrolling in summer courses. Foreign language proficiency or a thesis are not required for the evening M.P.A. degree.

The midcareer curriculum emphasizes the practical application of the theories, values, and managerial skills critical to success in public life. Over half (30 credits) of evening students' credits are in specialized courses taught from the perspective of the nonprofit or governmental administrator. This integrated core curriculum acknowledges the importance of the traditional core curriculum topics taught in the day program, but presents them in a way that better reflects the actual practice of public managers and policy analysts. The integrated public management sequence (9 credits in three consecutive quarters) analyzes the institutional and political context of modern public management. The integrated analytic reasoning sequence (9 credits in three consecutive quarters) is an introduction to the major analytic concepts and tools needed by public managers, including economic, qualitative, and quantitative analysis. The public leadership seminars (12 credits in four quarters over the three-year program) are linked courses focusing on the societal context of managerial life, the integrated use of analytic and management concepts in the making of policy, analysis of selected problems confronting public and nonprofit sector managers, and a team project to analyze and propose solutions to major strategic challenges facing local organizations. Students are also required to take core courses in budgeting and the values of public life.

Students accumulate their remaining credits from electives selected from GSPA's extensive evening curriculum. This curricular structure permits midcareer students to design their own academic plan in a way that best suits their professional needs and interests.

Admission Requirements

The Graduate School of Public Affairs admits students on an annual basis, for summer or autumn quarters only. The application deadline for either quarter is February 1.

The prospective student must hold a baccalaureate degree from an accredited college or university in the United States, or its equivalent from a foreign institution. The student's academic record should be a strong one, with a minimum GPA of 3.00 on the last 90 (quarter) or 60 (semester) credits of undergraduate work. Scores on the Graduate Record Examination (GRE) general test are also required for admission.

The primary criterion for admission to the School is the applicant's demonstrated ability to complete the graduate program while sustaining a high level of achievement. GSPA's Admissions Committee considers grades and test scores, and also gives considerable weight to professional experience, volunteer work, letters of recommendation, and the applicant's writing skills as demonstrated in a personal essay.

Applicants for the evening degree program must also demonstrate seven to ten years of progressively responsible administrative experience. If prospective students have spent most of their careers in the private sector, they will need to demonstrate an active interest in, and contact with, public policy issues.

Although the School has no formal undergraduate course requirement for admission, GSPA's core courses in economics and quantitative methods as-

sume that entering students have been exposed to these subjects at the undergraduate level. Ideally, new students will possess an academic or professional background in governmental processes, excellent writing skills, and academic preparation in microeconomics and statistics. Students lacking sufficient preparation in these areas may be required to demonstrate aptitude prior to admission, or may be asked to take preparatory course work in addition to the basic M.P.A. degree requirements.

Financial Aid

The Graduate School of Public Affairs has limited departmental financial aid. The UW Office of Student Financial Aid is the primary source of financial assistance for M.P.A. students. The most common forms of University aid are work-study awards and Stafford or Perkins loans. Only full-time students are eligible for non-loan forms of university financial aid.

In order to receive priority consideration for UW financial aid, the Free Application for Federal Student Aid (FAFSA) must be received by the central processor (located in Iowa) by February 28 of the year of application to the school. Applicants should mail their completed FAFSA forms at least two weeks ahead of this deadline. FAFSA forms can be obtained from the UW Office of Student Financial Aid, Box 355880, (206) 543-6101, or from the financial aid office of any college or university.

Each year the Graduate School of Public Affairs awards a limited number of departmental fellowships. In order to receive consideration for these awards, applicants must complete the GSPA financial aid application. These forms are included in the GSPA application packet. First-year students are also eligible to apply for some research assistantships. These appointments are generally made after autumn quarter begins. Teaching assistantships are reserved for second-year students. Paid internships with public agencies can also provide students with additional income during their tenure at GSPA.

Correspondence and Application Information

A program brochure and application may be obtained from the Director of Admissions, Graduate School of Public Affairs, Box 353055, or by telephoning (206) 543-4900.

Research Facilities

The culture of the Graduate School of Public Affairs promotes the integration of extensive applied research into the academic program. In addition to supporting the independent research of its faculty members, the School houses several policy centers.

Institute for Public Policy and Management

The Institute for Public Policy and Management (IPPM) initiates and conducts major applied research projects for public managers and elected officials, drawing upon the skills and knowledge of University researchers, faculty members, graduate students, and practitioners from various public and private organizations. Through research, consultancy, conferences, publications, and training, the IPPM enhances the ability of public sector officials and the general public to understand major public policy issues and to make sound public management decisions.

Northwest Policy Center

The Northwest Policy Center (NPC) was established in 1987 as a model regional program to develop and improve public strategies which promote economic vitality in the five-state Northwest region. NPC conducts policy research, designs and evaluates policy alternatives, and promotes the continuous exchange of information among regional policymakers.

Cascade Center for Public Service

The Cascade Center for Public Service was established in 1987 to enhance the quality of public management in the Northwest through the design and delivery of executive education programs. The center offers an extensive set of training programs tailored to senior and mid-level public managers and to elected officials in state and local government. In addition, the center's Curriculum Development Project is working to improve the development and availability of new teaching tools and techniques through the use of a computer distribution network to distribute new case studies, skill exercises, and teaching notes.

Human Services Policy Center

Founded in 1991, the Human Services Policy Center (HSPC) is an interdisciplinary research center focused upon issues relating to families and children. It was created to help professionals forge links among schools and service agencies to improve service delivery to children and families. HSPC's mission includes program evaluation and data analysis to help policymakers and the general public better understand these critical issues. The center is a collaborative endeavor involving faculty from several University of Washington professional schools: Public Affairs, Public Health and Community Medicine, Education, Social Work, Nursing, and Communications.

Program for Reinventing Public Education

In conjunction with the Rand Corporation, this program will develop, test, and help communities adopt alternative governance systems for public elementary and secondary education. It will refine and improve these concepts through research and development and evaluation of results. It will also build a national network of local business, civic, and political leaders who are dedicated to reforming the governance of their own education systems.

Fiscal Policy Center

The Fiscal Policy Center (FPC) studies the impacts of state taxes and spending on the lives of those who live in or near poverty, and those who are otherwise vulnerable to changing state tax policies. This center combines strong analytical capacity with extensive community advocacy and policymaker contacts in order to frame public debate on state tax and spending policies as they affect these populations. In addition to conducting research and analysis, the FPC hosts seminars, conferences, and specialized briefing sessions to communicate findings to decision makers and to the general public.

Faculty

Professors

Beyers, William B. * 1962, (Adjunct); PhD, 1967, University of Washington; economic geography, regional analysis, regional development.

Crutchfield, James A. * 1960, (Emeritus); PhD, 1954, University of California (Berkeley); natural resources economics, policy and management, especially marine and environmental resources.

Gordon, Andrew * 1988; PhD, 1970, Columbia University; information policy and organizational dynamics.

Gordon, Margaret T. * 1988; PhD, 1972, Northwestern University; news media and public policy; violence against women.

Hill, Paul T. 1993, (Research); PhD, 1972, Ohio State University; education policy and reform.

Hyman, Barry * 1975; PhD, 1965, Virginia Polytechnic Institute and State University; energy policy, technology and public policy, quantitative methods.

Karr, James R. * 1991, (Adjunct); PhD, 1970, University of Illinois; ecology and conservation biology, water resources, environmental sciences, natural resources.

Locke, Hubert G. * 1976; MA, 1962, University of Michigan; criminal justice, urban policy, race and ethnic relations.

Madden, Carolyn Watts * 1984, (Adjunct); MA, 1974, PhD, 1976, Johns Hopkins University; health economics and policy.

May, Peter J. * 1979, (Adjunct); PhD, 1979, University of California (Berkeley); policy analysis, quantitative methods, federal disaster policy.

Miles, Edward L. * 1974; PhD, 1965, University of Denver; international law and organization, science and international relations, marine policy.

Morrill, Richard L. * 1955, (Adjunct); PhD, 1959, University of Washington; spatial organization, migration, population, diffusion, regional planning/development, inequality.

Plotnick, Robert D. * 1984; MA, 1973, PhD, 1976, University of California (Berkeley); economics of poverty, labor and social welfare policy.

Wen, Edward 1970, (Emeritus); MS, 1947, Harvard University; PhD, 1950, Johns Hopkins University.

Williams, Walter * 1970; PhD, 1960, Indiana University; executive branch decision making, policy implementation.

Wolfe, Dael L. * 1982, (Emeritus); PhD, 1931, Ohio State University; science and public policy.

Zerbe, Richard O. * 1975; PhD, 1969, Duke University; law and economics, cost-benefit analysis, economic history, environmental regulation.

Associate Professors

Brandon, Richard N. * 1989, (Research); PhD, 1975, University of Pennsylvania; human services: collaboration, data; US Congress, legislation and budget process.

Brock, Jonathan 1982; MBA, 1973, Harvard University; labor relations, negotiation and mediation, public management, managing people.

Dobel, J. Patrick * 1985; PhD, 1976, Princeton University; political theory, ethics and public policy, organizational theory.

Miller, Ernest G. * 1965, (Emeritus); PhD, 1959, Princeton University; management and organizational development, organization theory, administrative behavior.

Narver, Betty Jane 1991, (Research); MA, 1973, University of Washington; state and local fiscal policy, social and health policy, education and workforce training.

Pivo, Gary E. * 1987, (Adjunct); PhD, 1987, University of California (Berkeley); land use and physical planning, environmental planning, growth management.

Sommers, Paul E. * 1985, (Research); PhD, 1978, Yale University; economic development policy, regional economics.

Ulberg, Cyrus G. * 1985, (Research); PhD, 1973, University of Michigan; transportation policy, forecasting and pricing topics.

Zumeta, William M. * 1985; PhD, 1978, University of California (Berkeley); public management, policy analysis, education and workforce policy.

Assistant Professors

Cullen, Alison 1995; DSc, 1992, Harvard University; environmental policy, environmental exposure and risk assessment, uncertainty and decision analysis.

Eliason, Leslie Carol * 1988; MA, 1985, PhD, 1988, Stanford University; comparative politics, European public policy, comparative education and health care policy.

Klawitter, Marleka * 1990; MS, 1986, University of Wisconsin; family and employment policy, health economics, women's studies.

Madison, John J. 1995; MS, 1981, American University; PhD, 1994, George Mason University; public administration.

McIntire, James L. 1991, (Research); MPP, 1978, University of Michigan; PhD, 1993, University of Washington; housing policy, state tax policy, labor market policy.

Smith, Steven R. 1996; PhD, 1988, Massachusetts Institute of Technology; health and social policy, voluntarism, nonprofit management, community development.

Thomas, Tom E. 1988, (Adjunct); MPP, 1979, University of Michigan; MBA, 1985, PhD, 1989, University of California (Berkeley); organization and environment, corporate political strategic management.

Weinberg, Lisa Ellen 1993; PhD, 1993, Virginia Polytechnic Institute and State University; organizational processes and dynamics; intergovernmental and government/non-profit agency relations.

Senior Lecturer

Cornick, Gerald W. 1975; PhD, 1971, University of Michigan; mediation and negotiation.

Lecturer

Harrison, David S. 1986; MPA, 1979, Harvard University; regional economic development.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

PB AF 499 Special Topics (3-5) Study and analysis of special topics in public affairs. Prerequisite: junior or senior status.

Courses for Graduates Only

PB AF 500 General Seminar (1, max. 9)

PB AF 502 Political Management of Policy Process (3) Analyzes the issues which public managers address when they seek to make and implement public policy and programs. Pays particular attention to the institutional and political constraints on policy making and the skills needed to address them.

PB AF 503 Administrative and Executive Leadership (3) Nature of executive life in the public sector, the function of leadership in implementing, making, and changing policy. Leadership styles, the relation of leadership to its constituencies and communities. Offered: jointly with POL S 572.

PB AF 504 Administrative Ethics (3) Moral dilemmas that confront public managers. Critical view of societal and political values that prescribe moral behavior. Organizational and professional ethics. Ethical problems of public organization managers. Systematic means for understanding, analyzing, and coping with moral issues that appear in a career.

PB AF 505 The Law of Public Administration (3) Legal framework of public administrative action in the United States, emphasizing constitutional requirements; operation of the administrative process; management of personnel, funds, and contracts; and judicial review of administrative activity.

PB AF 506 Ethics and Public Policy (3) Teaches students to identify moral issues in public life. Special focus on the integration of moral concerns into public discussion in a manner which contributes to good policy and does not polarize issues. Discusses moral and political theory by focusing on contemporary cases and issues.

PB AF 507 International Organizations and Ocean Management (3) Survey of the manner in which international organizations attempt to manage and regulate the uses of the ocean. Primary emphasis on the analysis of processes that support or constrain these organizations and on the search for alternative policies and organizations. Prerequisite: SMA 500 or permission of instructor. Offered: jointly with SMA 507.

PB AF 508 Management Approaches to Service Delivery (3) Examines how services can be delivered in a way that is both responsive to the needs of those being served and maximizes the effective utilization of resources. Topics addressed include: needs assessment, process analysis, service strategy, sustaining the service organization, case management, and services integration.

PB AF 509 Public Organizational Theory (3) Approaches to the study of organizational behavior in a changing society, including consideration of formal and informal organization, personality needs, role playing, client relations, and the sociopolitical and technological environments.

PB AF 510 Management Analysis (3) Survey of the theory and current practice relating to governmental organizations and their program objectives.

PB AF 511 Management of Not-for-Profit Organizations (3) Focuses upon the roles played by not-for-profit organizations in meeting the public good. Examines internal management issues such as structure, budget, and operations; and external issues such as board functions, legal status, marketing, media relations, and fund-raising.

PB AF 512 Management of Public Enterprises (3) Examines issues in managing public enterprises. Provides comparative analysis of policies, development, and management approaches of such enterprises with regard to traditional government agencies, private sector business, and public enterprise of other countries. Special focus on "balancing" business and competitive requirements with public policy/process and the political environment.

PB AF 513 Public Policy Analysis (3) Production and use of analysis to support public policy decisions. Defining problems, devising alternative solutions, clarifying stakes in choices, predicting impacts of choices. Skills developed by working on specific policy problems. Assumes familiarity with statistics, microeconomic theory, and institutions and processes of American government. Prerequisite: 516 or permission of instructor.

PB AF 514 Policy Implementation (3) Presents set of analytic skills for anticipating and diagnosing implementation problems. Primarily for students who plan to become public-sector policy analysts or managers. Mastery of basic literature and its application to solving problems of public policy, including estimating feasibility of policy alternatives and identifying sources of implementation failure, is expected.

PB AF 515 Decision Making for Public Managers (3) Considers decision making from normative, prescriptive, and descriptive perspectives. Emphasizes individual decision making, with some discussion of organizational decision practice. Focuses on decision analysis; presents tools for structuring decisions; and considers the role of analysis as a basis for negotiation.

PB AF 516 Microeconomic Policy Analysis (3) Ways in which microeconomic analysis can contribute to the analysis of public sector issues. Supply and demand, consumer and firm behavior, competitive and monopoly markets, income distribution, market failure, government intervention. Policy applications of theory. Prerequisite: elementary economics.

PB AF 517 Economics of the Public Sector (3) Methods of analyzing effects of public expenditures and taxes on behavior of individuals and firms, on economic efficiency, and on equity and distribution of

income. Theory and practice of intergovernmental fiscal relations. Application of theory to formulation of public policy. Prerequisite: 516.

PB AF 519 Policy Analysis Workshop (3) Techniques and methods required in social policy analysis, including the technical issues in developing, using, interpreting research relevant for social policy and bureaucratic problems. Designed to aid future administrators and analysts in performing policy analysis, working with researchers to develop relevant studies and with the agency bureaucracy to integrate research and analysis. Prerequisite: permission of instructor.

PB AF 520 Intergovernmental Relations (3) Comparative study of the issues involved in implementing government programs across multiple jurisdictions. Issues of accountability, feasibility, politics, and constitutional limits are examined by focusing upon various methods used to implement programs across federal, state, regional, and international jurisdictions.

PB AF 521 Public Management: Program Planning and Design (3) Policy context of planning and programming, the institutionalization of purpose, the planning process, activity design, work scheduling and measurement, and program evaluation.

PB AF 522 Public Management: Budgeting (3) Budgeting as a management process. Study of formulation and administration of government budgets, including role of budgeting in policy processes, approaches to budget formulation and analysis, development of the PPB approach, and aspects of budget administration, such as revenue estimating, allotment control, cost accounting. Prerequisite: 516 or permission of instructor.

PB AF 523 Public Management: Personnel (3) Study of line-staff decision making in acquisition and use of human resources in public organizations, including evaluation of job responsibilities, establishment of compensation levels, collective bargaining, selection and placement, performance appraisal, incentive management, and training.

PB AF 524 Managing People in Public and Non-profit Agencies (3) Emphasizes the role of the program manager rather than that of the personnel officer. Managing people within a variety of programmatic, bureaucratic, and political settings. Case studies form basis of class discussion, assignments.

PB AF 525 Organizational Development in Public Agencies (3) Philosophies, theories, and models of behavioral science interventions in organizational diagnosis and development (OD). In addition to a review of the basic literature dealing with the OD approach, emphasis is placed on examination of case studies and class experience in OD applications, including organizational diagnosis, problem confrontation, and team building. Prerequisite: permission of instructor.

PB AF 526 Program Evaluation (3) Theory, practice, and politics of evaluation, from simple feedback mechanisms to evaluation of large-scale ongoing programs and social experiments. Emphasis on applications of experimental and quasi-experimental evaluation. Case studies illustrate various types of evaluation. Prerequisite: background in quantitative methods.

PB AF 527, 528 Quantitative Analysis: Quantitative Analysis for Public Managers (3,3) Introduces quantitative methods in the context of public management and policy analysis. Covers descriptive statistics, hypothesis testing, linear models, and research design and modeling. Helps students become knowledgeable consumers of empirical evidence. Prerequisite: graduate status in School of Public Affairs or permission of instructor for 527, 527 for 528.

PB AF 529 Quantitative Applications in Public Affairs (3)

PB AF 530 Financial Management in the Public Sector (3) Exploration of the managerial uses of accounting and other processes of financial manage-

ment in the public sector. Topics covered include: financial planning and control, fund accounting, cost accounting, asset accounting, internal controls, auditing, financial analysis, and financial reporting. Prerequisite: permission of instructor.

PB AF 534 International Affairs (3) Provides a broad understanding of international issues and United States policy. Students explore U.S. foreign policy and theories of major international actors in international trade, security, and strategic concerns, refugee policy, conflict resolution, development assistance, and the environment. Offered: jointly with POLS/SIS 534.

PB AF 537 Topics in International Affairs (3, max. 12) Examines topics of interest and import in foreign policy and international affairs. Focuses on the in-depth analysis of issues and the integration of economic, institutional, and political dimensions.

PB AF 538 Legislative Relations (3) Studies role of legislative bodies in American public policy making. Builds on case studies and focuses on tactics, constraints, and options involved in working within a legislative process to achieve public policy goals.

PB AF 540, 541, 542 Integrated Public Management Sequence (3, 3, 3) Analyzes the institutional and political context of modern public management. Cases, readings, and discussion provide an integrated introduction to the major skills needed to successfully lead and manage government and nonprofit organizations.

PB AF 543, 544, 545 Integrated Analytic Reasoning Sequence (3, 3, 3) Introduction to the major analytic concepts and tools needed by public managers, including economic, qualitative, and quantitative analysis. Focus on learning to use and assess the different analytic tools and understand their proper use in the making of policy and the management of government and nonprofit organizations.

PB AF 546 Public Leadership Seminar (3) Focus on the societal context of managerial life. Credit/no credit only. Prerequisite: permission of instructor.

PB AF 547 Public Leadership Seminar (3) Integrated use of analytic and management concepts in the making of policy. Prerequisite: 546.

PB AF 548, 549 Public Leadership Seminar (3, 3) Team project for an outside client or organization and an analysis of selected problems confronting managers of public and nonprofit organizations. Prerequisite: 547.

PB AF 550 Public Arts Policy and Management (3) Role of government in arts. Range of public support at federal, state, and local levels; reasons for its development and viability. Nature, evolution, functions of public arts agencies in implementing arts policy; relation of such agencies to their constituencies. Seattle, King County, and Washington State serve as case studies.

PB AF 551 Comparative Administrative Systems (3) Methodological problems of research in comparative administration. Theoretical and substantive aspects of administrative systems in urban-industrial and developing nations. Offered: jointly with SIS 551.

PB AF 552 Administrative Problems of Development (3) Problems of administering developing nation-states and regions, including theoretical aspects of development administration, bureaucratic change, administrative-political interaction in policy making, organizational development, political impact of administering major programs. Prerequisite: permission of instructor.

PB AF 553 Applied Cost-Benefit Analysis (3) Familiarity developed through problems and applications. Techniques of use stressed. Prerequisite: 516 or permission of instructor.

PB AF 554 Advanced Cost-Benefit Analysis (3) Techniques of, and theoretical foundation for, cost-

benefit analysis as applied to the public sector. Prerequisite: 553 or ECON 500, 501 or permission of instructor. Offered: jointly with ECON 554.

PB AF 558 Mediation and Negotiation as Instruments of Public Management and Policy-Making (3) Possibilities offered by mediation and negotiation methods using a mixture of cases, readings, discussions, lectures, and guest speakers. Use of negotiation and mediation techniques to resolve disputes and disagreements over public-policy issues.

PB AF 561-562 Policy Development and Administration: Urban Affairs (3-3) Two (noncumulative) courses to examine the structure, function, and process of city government, with special emphasis on the origin, content, and implementation of public policies. Focus on the political process at the municipal level including the distribution of influence, the political actors, the decision-making machinery, and the policy output.

PB AF 565 Topics in Urban and Regional Affairs (3, max. 12) Examines various issues of public policy importance in urban and regional affairs by integrating managerial, political, policy, and economic dimensions of the issues.

PB AF 568 Seminar in Law and Justice (3) The current volatility in American law enforcement revolves around a number of policy issues that have emerged in the past decade and are considered crucial to the future role, organization, and function of urban policing. These issues are explored, with emphasis on their historic settings, the "actors" who shape their articulation, the parameters of the debate, effects of legal constraints and sociopolitical factors on the development of policy alternatives, and emerging patterns of resolution.

PB AF 569 Race and Public Policy (3) Analyzes the way in which the persistent problem of race is expressed in the formation and implementation of social and public policy.

PB AF 570 Social Policy Analysis and Management (3) Examines major institutions and programs in the human resources policy area: education, regulation of labor market, health care, income maintenance, social services. Discusses alternative policy instruments, analytic perspectives, intergovernmental issues, and management issues arising across policy areas. Explores challenges of linking services and clients across separate agencies.

PB AF 571 Education, The Workforce, and Public Policy (3, max. 6) Examination of policy issues involving education, training, the economy, and the development of the nation's human resources. Relationship between education, training, and work, underutilized workers, race and gender discrimination issues, and the role of education and training in economic development. Offered: jointly with EDLPS 563.

PB AF 573 Topics in Education and Social Policy (3, max. 12) Examines various issues of public importance in the areas of education and social policy. Focuses on in-depth analysis of relevant issues and the integration of the economic, administrative, and political dimensions of these issues.

PB AF 575 Public Policy Processes (5) Political science frameworks, approaches, and theories concerning development and implementation of public policies within American political systems. Governmental behaviors and processes, including rational, political, and bureaucratic models of governmental decision making; agenda-building processes; and normative perspectives concerning role of governmental entities. Offered: jointly with POL S 575.

PB AF 577 Risk Assessment for Environmental Health Hazards (3/4) Context, methodologies, types of data, uncertainties and institutional arrangements for risk assessment. Both qualitative and quantitative approaches to the identification, characterization, and control of environmental hazards to health emphasized through didactic and case studies. Offered: jointly with CEWA/ENV H 577.

PB AF 580 United States Energy Policy (3) Energy policy formulation and implementation with emphasis on post-1973 developments. Energy conservation programs; changing roles of oil, coal, gas, nuclear, and solar energy; institutional, environmental and equity considerations; government research and development programs.

PB AF 581 Information Technology and the Policy-Making Process (3) Demystifies information base for policy making in democracies. Examines theoretical and practical issues associated with information processing in the public sector. Considers role of new technologies in collecting, analyzing, and disseminating information with special attention to the relationship between these technologies and effective government service, public participation, and organizational accountability.

PB AF 582 News Media and Public Policy (3) Explores impacts of news coverage on public policy. Exposure to journalists' approaches to coverage of public affairs, as well as to strategies used by leaders of public/non-profit agencies to attract favorable coverage and minimize damaging coverage. Students learn techniques for assessing impacts of news coverage.

PB AF 583, 584 Seminar in Science and Public Policy (3,3) Issues and problems relating to the interaction of science and scientists with the public policy-making process. Science versus the nature and values of political processes, and the continuing tensions between the two. The evolving interaction between scientific and technical knowledge and political power; scientific versus ethical judgments. Role of science in the establishment of national goals. Plans and proposals for increasing governmental competence to deal with public policy issues involving science and technology.

PB AF 585 Topics in Science, Technology, and Public Policy (3) Examines relationship between advancement of technical knowledge and pace of technological change, and public policies to induce or respond to these trends. Generic issues of government research, development, and personnel training programs are addressed. Applications of policy issues involving biomedical, communications, energy, environmental, transportation, and weapons technologies.

PB AF 586 International Science and Technology Policy (3) Seminar is designed: first, to analyze the relationships between research and development policy, capabilities, and national technological strategies for advanced industrial and less-developed countries; second, to deal with the international implications of particular technologies as countries try to make policy for them in regional and global organizations. Examples of specific technologies are chosen from such fields as space telecommunication, weather and climate modification, airline transportation, nuclear energy, and seabed exploitation.

PB AF 590, 591 Midcareer Seminar (3,3) Interdisciplinary seminar in public policy for midcareer professionals.

PB AF 593 Environmental Policy Processes (3) Presents background to establish the need for environmental policy. Explores in a comparative manner, examining both successes and failures, various strategies that have been used or proposed to protect the environment.

PB AF 594 Environmental Policy Analysis: Risks and Values (3) Emphasizes institutions involved in environmental policy including the government, environmental organizations, and private business. Examines ways in which the nature of these institutions affects the substance and ultimate effect of the environmental policy implemented.

PB AF 595 Topics in Environmental Policy and Management (3, max. 12) Examines various topics of public importance in environmental policy and management. Integrates the political, managerial, and economic dimensions of these issues.

PB AF 598 Administrative and Policy Skills Workshop (1-3) Teaches practical administrative, leadership, and analytic skills commonly required of managers and analysts in the public and non-profit sectors. The workshops emphasize hands-on problem resolution, simulations, and actual practice.

PB AF 599 Special Topics (2-6) Study and analysis of special topics in public affairs. Topics vary each quarter depending on curricular needs and interests of students and faculty. Prerequisite: permission of instructor.

PB AF 600 Independent Study or Research (*)

PB AF 605- Degree Project ([1-6]-)

School of Public Health and Community Medicine

Dean

Gilbert S. Omenn
F350 Health Sciences

Associate Dean

Patricia W. Wahl

The School of Public Health and Community Medicine is composed of five departments: Biostatistics, Environmental Health, Epidemiology, Health Services, and Pathobiology. The School offers graduate programs leading to the degrees of Master of Public Health, Master of Science, and Doctor of Philosophy. A Bachelor of Science degree is offered by the Department of Environmental Health. Admissions requirements vary by degree and field and are described in the sections of each department.

Master of Public Health Degree: The M.P.H., a professional degree offered in environmental health, epidemiology, and health services, prepares public health practitioners. Students earning the M.P.H. may emphasize community medicine, epidemiology, maternal and child health, occupational medicine, social and behavioral sciences, or international health.

Master of Science and Doctor of Philosophy Degrees: M.S. and Ph.D. programs in biostatistics, environmental health, epidemiology, and pathobiology prepare students for academic or research careers. Students may pursue a special doctoral program in health services in conjunction with other departments of the University.

Special and Conjoint Programs: The Extended M.P.H. Program allows midcareer public health professionals to pursue the M.P.H. degree in health services or health education while continuing their employment. The School, together with the School of Business Administration and the Graduate School of Public Affairs, offers the Master of Health Administration (M.H.A.) degree. A conjoint program with the School of Business Administration leads to concurrent M.H.A.-M.B.A. degrees. A special program offered by the School of Public Health and Community Medicine and the Henry M. Jackson School of International Studies offers students the opportunity to earn concurrent M.P.H.-M.A.I.S. degrees. Conjoint with the School of Social Work, students may earn concurrent M.S.W.-M.P.H. degrees in maternal and child health and human services. Graduate students in the School of Nursing may pursue concurrent M.N.-M.P.H. degrees in community health care or in parent and child nursing. Medical students may earn concurrent M.D.-M.P.H. degrees. The Department of Health Services offers a Certificate Program in Health Information Administration (HIA).

Residency Programs: The School offers residencies in preventive medicine and occupational medicine. Physicians also are welcome to apply to any of the School's graduate programs.

Biostatistics

F600 Health Sciences

The Department of Biostatistics offers Master of Science and Doctor of Philosophy degrees in quantitative methods applied to the medical and biological sciences. Biology, medicine, and health services are undergoing major changes in their development as quantitative sciences. As technological advances find expression in new research tools, new theoretical concepts are being employed in the analysis of quantitative data. The techniques and viewpoints of mathematics and statistics, traditionally peripheral to biology and medicine, are now woven into the fabric of the life sciences, thereby providing exciting new opportunities in research and teaching.

Many universities have instituted programs relating mathematics or statistics to one particular biological field. The goal of the biostatistics graduate program is to equip students to develop and apply the quantitative techniques of mathematics, statistics, and computing appropriate to medicine, biology, and health services.

Because of the faculty's involvement in a diversity of statistical applications, students receive an education of high quality. Students are recruited from undergraduate programs in mathematics, statistics, and biology and are selected on the basis of outstanding quantitative ability.

Admission Requirements

Students may enter the program from an undergraduate major in mathematics, statistics, or a biological field. An applicant must have completed or be in the process of completing two years of calculus (to include one year of advanced calculus), one course in linear algebra, and one course in probability theory.

In addition to fulfilling graduate admission requirements, an applicant must submit three letters of recommendation from persons competent to evaluate the applicant's abilities, a narrative statement concerning the applicant's purpose and interest in entering the program, and an official Graduate Record Examination score report. Recommendation for selection of candidates is made by a faculty admissions committee, with review of applicants beginning in January for admission autumn quarter. Early application for financial aid is advantageous. The application deadline is April 15.

Master of Science

Students working for the Master of Science degree must complete required course work, demonstrate proficiency in a computer language, write a thesis, take a consulting class, and pass the first-year theory examination. This examination is offered at the conclusion of a student's first year, and, if a student does not pass, it can be retaken the next year. A Ph.D. student may receive a nonthesis Master of Science degree by successfully passing the first- and second-year qualifying examinations.

Doctor of Philosophy

Students earning the Ph.D. degree develop statistical theory and applications particular to the health sciences.

Students in the Ph.D. program must complete 36 credits of BIOST 800, write a dissertation, complete a consulting class, and demonstrate proficiency in a computer language. Students must also pass the Ph.D. statistical theory and applied theory qualifying examinations, a biology project, and pass the General and Final Examinations.

Correspondence and Information

Graduate Program Coordinator
Department of Biostatistics, Box 357232

Faculty

Chair

Thomas Richard Fleming

Professors

Blumenstein, Brent A. * 1981, (Affiliate); PhD, 1974, Emory University; clinical trials, categorical data analysis, research data management.

Breslow, Norman E. * 1967; PhD, 1967, Stanford University; statistical methods in epidemiology, generalized linear models, childhood cancer.

Crowley, John Jr. * 1982; MS, 1970, PhD, 1973, University of Washington; survival analysis, cancer clinical trials.

Davis, Kathryn A. B. * 1974; PhD, 1974, University of Washington; density estimation, cardiovascular data analysis, clinical trials.

De Rouen, Timothy * 1975; PhD, 1971, Virginia Polytechnic Institute & State University; applications of biostatistics to clinical epidemiology of oral and infectious diseases.

Diehr, Paula K. * 1970; MS, 1967, PhD, 1970, University of California (Los Angeles); health services; application of statistics to small area analysis.

Feigl, Polly * 1969; MA, 1957, PhD, 1961, University of Minnesota; application of statistics to cancer control and prevention research.

Fisher, Lloyd D. * 1966; MA, 1965, Massachusetts Institute of Technology; PhD, 1966, Dartmouth College; new drugs/biologics in humans; evaluation/clinical trial methodology; cardiovascular data analysis.

Fleming, Thomas Richard * 1984; MA, 1974, PhD, 1976, University of Maryland; survival analysis, cancer clinical trials, AIDS research, sequential analysis.

Green, Stephanie J. * 1984, (Affiliate); MA, 1973, Indiana University; PhD, 1979, University of Wisconsin; censored survival, data analysis, clinical trials, cancer research.

Grizzle, James E. * 1987, (Research); MS, 1953, Virginia Polytechnic Institute & State University; PhD, 1960, North Carolina State University; clinical trials, cancer prevention studies.

Hallstrom, Alfred * 1975; MSc, 1961, PhD, 1968, Brown University; clinical trial methodologies in cardiovascular research and emergency medical services applications.

Kopecky, Kenneth J. * 1978, (Affiliate); MS, 1975, PhD, 1977, Oregon State University; clinical trials design and survival data analysis, epidemiologic methodology, goodness of fit.

Kronmal, Richard A. * 1964; PhD, 1964, University of California (Los Angeles); nonparametric density estimation, computer algorithms, cardiovascular data analysis, clinical trials.

Martin, Donald C. * 1972; MS, 1961, PhD, 1968, Florida State University; statistical computing, randomization tests, approximations for probability functions.

McKnight, Barbara * 1981; PhD, 1981, University of Wisconsin; statistics in animal carcinogenicity testing, epidemiology and human genetics; survival analysis.

Moolgavkar, Suresh H. * 1984, (Adjunct); MBBS, 1966, Bombay University (India); PhD, 1973, Johns Hopkins University; cancer epidemiology, development of quantitative methodology.

O'Sullivan, S. Finbarr * 1987; PhD, 1983, University of Wisconsin; nonparametric curve estimation, inverse problems, radiology.

Perrin, Edward * 1975, (Adjunct); MA, 1956, Columbia University; PhD, 1961, Stanford University; health information services, research methodology.

Peterson, Arthur V. * 1975; MS, 1971, PhD, 1976, Stanford University; survival data methodology, competing risks, design of disease prevention trials.

Prentice, Ross L. * 1974; MSc, 1968, PhD, 1970, University of Toronto (Canada); failure time analysis, disease prevention trials, epidemiologic methods, dietary factors and disease.

Self, Steven G. * 1984; MS, 1977, California State University, Long Beach; PhD, 1981, University of Washington; longitudinal data analysis, survival time models, cancer prevention, HIV vaccine evaluation.

Storer, Barry E. 1996, (Affiliate); MA, 1977, University of Montana; PhD, 1983, University of Washington; design and analysis of Phase I and II clinical trials, statistical methods for epidemiology.

Thompson, Elizabeth A. * 1985; PhD, 1974, Cambridge University (UK); statistical analysis of human genetic data, statistics of conservation and computational biology.

van Belle, Gerald * 1975; MA, 1964, PhD, 1967, University of Toronto (Canada); biostatistics, environmental risk factors for neurodegenerative diseases, risk communication.

Wahl, Patricia W. * 1971; PhD, 1971, University of Washington; multivariate statistical techniques, especially regression analysis applied to cardiovascular data.

Wellner, Jon A. * 1983; PhD, 1975, University of Washington; large-sample theory, asymptotic efficiency, empirical processes, semiparametric models.

Associate Professors

Barlow, William E. * 1989, (Research); MS, 1982, PhD, 1986, University of Washington; survival analysis, residuals, and evaluation of screening programs.

Benedetti, Jacqueline K. * 1980; PhD, 1974, University of Washington; statistical methodology in infectious disease research, cancer clinical trials.

Conquest, Loveday L. * 1988, (Adjunct); PhD, 1975, University of Washington; statistics in forestry, fisheries, and environmental pollution monitoring.

Emerson, Scott S. * 1995; MD, 1981, University of Virginia; PhD, 1988, University of Washington; clinical trials, sequential testing, survival analysis, categorical data.

Lin, Danyu * 1990; PhD, 1989, University of Michigan; analysis of failure time data, designs and analysis of clinical and epidemiologic studies.

Pepe, Margaret * 1982, (Affiliate); MS, 1984, PhD, 1986, University of Washington; survival analysis, medical decision making, correlated data methods, child health issues.

Polissar, Nayak Lincoln * 1980, (Affiliate); PhD, 1974, Princeton University; statistical consulting, community surveys, clinical trials, demography, epidemiology, environment.

Temkin, Nancy R. * 1977; PhD, 1976, State University of New York (Buffalo); clinical trials, recovery models, statistical modeling of epileptic phenomena, survival analysis.

Thornquist, Mark Daniel * 1985, (Affiliate); MS, 1982, PhD, 1985, University of Wisconsin; ordinal/categorical response, repeated measures data, chemoprevention, group-randomized trials.

Wijman, Ellen M. * 1987, (Research); PhD, 1981, University of Wisconsin; human quantitative and population genetics.

Assistant Professors

Anderson, Garnet L. 1983, (Affiliate); MA, 1983, State University of New York (Binghamton); PhD, 1989, University of Washington; survival analysis, regression models, clinical trials.

Emond, Mary Jane 1994, (Research); MS, 1989, PhD, 1993, University of Washington; semiparametric estimation, multivariate data.

Etzioni, Ruth B. * 1991, (Affiliate); MS, 1987, PhD, 1990, Carnegie-Mellon University; statistical methods in cancer screening, Bayesian methods in biostatistics.

Feng, Ziding 1990, (Affiliate); MS, 1985, PhD, 1990, Cornell University; mixture models, disease prevention trial methodology, bootstrap techniques.

Gooley, Theodore A. 1993, (Affiliate); PhD, 1990, University of Arizona; design and analysis of clinical trials.

Heagerty, Patrick J. 1995; MS, 1991, State University of New York (Albany); PhD, 1995, Johns Hopkins University; regression techniques for dependent data, hierarchical models.

Hughes, James P. * 1993, (Research); MS, 1980, PhD, 1993, University of Washington; familial aspects of Alzheimer's disease, longitudinal methods, Markov models.

Le Blanc, Michael 1994, (Research); MA, 1984, University of Waterloo (Canada); PhD, 1989, University of Washington; tree-based methods for regression and exploratory survival analysis.

Leroux, Brian * 1991; PhD, 1989, University of British Columbia (Canada); random effect models, stochastic processes, dental research, toxicology.

Mancl, Lloyd A. 1986, (Adjunct Research); MS, 1988, PhD, 1992, University of Washington.

Rutter, Carolyn 1996, (Affiliate); MS, 1988, PhD, 1991, University of California (Los Angeles); applied statistics in psychology, methodological research related to analysis of longitudinal data.

Sheppard, Elizabeth A. * 1989, (Research); MSc, 1985, Johns Hopkins University; PhD, 1992, University of Washington; aggregate data, survival analysis, biostatistical methods in environmental health.

Wang, Ching-Yun 1993, (Affiliate); MS, 1985, National Taiwan University; PhD, 1993, Texas A&M University; case control studies, generalized linear models, measurement error models.

Whitney, Coralyn W. 1990, (Research); PhD, 1990, University of Washington; misclassification, latent structure analysis, reliability, and missing data.

Yanez, Norbert David III 1993; MS, 1989, PhD, 1993, Arizona State University; overdispersed data, joint modeling of mean and dispersion parameters, quasi-likelihood models.

Yasui, Yutaka 1996, (Affiliate); PhD, 1994, Johns Hopkins University; statistical methods in cancer epidemiology, spatial regression models, cancer prevention research.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

BIOST 111 Lectures In Applied Statistics (1) NW Weekly lectures illustrating the importance of statisticians in a variety of fields, including medicine and the biological, physical, and social sciences. Contact instructor for information on which fields of applications emphasized. Credit/no credit only. Offered: jointly with STAT 111; Sp.

BIOST 425 Introduction to Nonparametric Statistics (3) NW Overview of nonparametric methods, such as rank tests, goodness of fit tests, 2x2 tables, nonparametric estimation. Useful for students with only a statistical methods course background. Prerequisites: 473, 511, and STAT 311, or permission of instructor. Offered: jointly with STAT 425; when demand is sufficient.

Courses for Graduates Only

BIOST 502 Introduction to Statistics in Health Sciences (4) Description and examples of common concepts in biostatistics. Probability, point and confidence interval estimation, hypothesis testing including two-sample and paired t and chi-square tests, introduction to simple linear regression. Examples in health sciences stressed. Offered: S.

BIOST 503 Application of Statistics to Health Sciences (4) Standard statistical techniques presented with examples drawn from the health sciences literature. Critical interpretation of research results, and introduction to the computer for data processing and statistical analysis. Prerequisite: 502 or equivalent. Offered: S.

BIOST 510 Biostatistics In Dentistry (3) Introduction to concepts and methods of descriptive and inferential statistics with applications in dentistry emphasized. Topics include comparison of means and proportions, hypothesis testing, confidence intervals, nonparametric methods, linear regression, and correlation. Prerequisite: enrollment in School of Dentistry of Permission of instructor. Offered: jointly with DPHS 568.

BIOST 511 Medical Biometry I (4) Presentation of the principles and methods of data description and elementary parametric and nonparametric statistical analysis. Examples are drawn from the biomedical literature, and real data sets are analyzed by the students after a brief introduction to the use of standard statistical computer packages. Statistical techniques covered include description of samples, comparison of two sample means and proportions, simple linear regression and correlation. Offered: AWS.

BIOST 512 Medical Biometry II (4) Multiple regression, analysis of covariance, and an introduction to one-way and two-way analyses of variance: including assumptions, transformations, outlier detection, dummy variables, and variable selection procedures. Examples drawn from the biomedical literature with computer assignments using standard statistical computer packages. Prerequisite: 511 or equivalent. Offered: W.

BIOST 513 Medical Biometry III (4) Analysis of categorical data including two sample methods, sets of 2 x 2 tables, R x C tables, and logistic regression. Classification and discrimination techniques. Survival analysis including product limit estimates and the Cox proportional hazards model. Prerequisite: 512 or permission of instructor. Offered: Sp.

BIOST 514 Biostatistics I (4) Mathematically sophisticated presentation of principles and methods of data description; graphics; point, confidence interval estimation; hypothesis testing; relative risk; odds ratio; Mantel-Haenszel; chi-square test (matrix algebra required). Examples drawn from biomedical literature; real-data sets analyzed using statistical computer packages. Prerequisite: biostatistics majors or permission of instructor. Offered: A.

BIOST 515 Biostatistics II (4) Mathematically sophisticated introduction to linear models; multiple regression, correlation; residual analysis; dummy variables; analysis of covariance; one-, two-way analysis of variance; randomized blocks; fixed, random effects (repeated measure, factorial designs); multiple comparisons (matrix algebra required). Real biomedical data sets analyzed. Prerequisite: 514, biostatistics major, or permission of instructor. Offered: W.

BIOST 521 Biostatistics for Experimentalists (4) Statistical aspects of design, data analytic models appropriate to classes of experiments most commonly employed in biomedical sciences. One-, two-way analyses of variance; factorial, crossed, nested, repeated measures designs. Clean, messy real-data sets analyzed using standard statistical computer packages. Prerequisites: 511, 512, or equivalent. Offered: alternate years; Sp.

BIOST 524 Design of Medical Studies (3) Design of medical studies, with emphasis on randomized controlled clinical trials. Bias elimination, controls, treatment assignment and randomization, precision, replication, power and sample size calculations, stratification, and ethics. Suitable for graduate students in biostatistics and for research-oriented graduate students in other scientific fields. Prerequisites: 511 or equivalent, and one of 513, STAT 421, 423, 512, or EPI 512; or permission of instructor. Offered: jointly with STAT 524, alternate years; Sp.

BIOST 529 Sample Survey Techniques (3) Design and implementation of selection and estimation procedures. Emphasis on human populations. Simple, stratified, and cluster sampling; multistage and two-phase procedures; optimal allocation of resources; estimation theory; replicated designs; variance estimation; national samples and census materials. Prerequisites: 421, 423, QMETH 500 or BIOST 511 or equivalent; or permission of instructor. Offered: jointly with STAT 529.

BIOST 532 Statistical Methods in Medical Genetics (2) *Wijman* Theory and application of statistical techniques used in medical genetics. In-depth discussion of linkage and segregation analysis and ascertainment problems. Applications stressed with reference to assumptions and limitations. Data sets analyzed with current computer programs. Prerequisite: knowledge of genetics or permission of instructor. Offered: jointly with MED 532; Sp.

BIOST 533 Classical Theory of Linear Models (3) Introduction to one-, two-way analysis of variance; randomized blocks; fixed, random effects, multiple comparisons. Statistical distribution theory for quadratic forms of normal variables. Fitting of the general linear model by least squares. Prerequisites: 513, STAT 421 or STAT 423; and STAT 513; and a course in matrix algebra. Offered: jointly with STAT 533; Sp.

BIOST 534, 535, 538 Statistical Computing (3, 3, 3) Introduction to scientific computing. Includes programming tools, modern programming methodologies, (modularization, object oriented design), design of data structures and algorithms, numerical computing and graphics. Uses C++ for several substantial scientific programming projects. Prerequisite: experience with programming in a high level language. Offered: jointly with STAT 534, 535, 538; A, W, Sp.

BIOST 536 Categorical Data Analysis in Epidemiology (4) Summary of univariate categorical data analysis; introduction to multivariate analysis of categorical epidemiologic data using multiplicative models. Experience at interpretation; familiarity with available programs gained by analysis of bona fide data, critiques of analyses appearing in literature. Prerequisites: 513 and EPI 514, or 515, or permission of instructor. Offered: jointly with EPI 536; A.

BIOST 537 Survival Data Analysis in Epidemiology (4) Introduction to multivariate analysis of survival data using multiplicative models. Application to epidemiologic studies. Familiarity with interpretation and available computer programs gained by analysis of bona fide sets of data and critiques of analyses appearing in the literature. Prerequisite: 536 or permission of instructor. Offered: jointly with EPI 537; W.

BIOST 570, 571, 572 Advanced Applied Statistics and Linear Models (3, 3, 3) Generalized linear models, REML in mixed models for randomized blocks, split plots, longitudinal data. Generalized estimating equations, empirical model building, cross validation, recursive partitioning, generalized additive models, projection pursuit. Prerequisites: STAT 512, 513; BIOST/STAT 533 or STAT 421 and 423, and a course in matrix algebra for 570; 570 for 571; 571 for 572. Offered: jointly with STAT 570, 571, 572.

BIOST 573 Statistical Methods for Categorical Data (3) Exact and asymptotic methods of analysis for 2 x 2 contingency tables. Maximum likelihood estimation of logistic regression models for binary re-

sponse variables, and selected examples of the use of these models in epidemiologic and clinical research. Introduction to the theory and applications of log linear models for discrete data. Selected special topics. Prerequisites: 571 and STAT 581, or permission of instructor. Offered: jointly with STAT 573, alternate years; Sp.

BIOST 574 Multivariate Statistical Methods (3) Use of multivariate normal sampling theory, linear transformations of random variables, one- and two-sample tests, profile analysis, partial and multiple correlation, multivariate ANOVA and least squares, discriminant analysis, principal components, factor analysis, robustness, and some special topics. Some computer use included. Prerequisite: 570 or permission of instructor. Offered: jointly with STAT 574, alternate years.

BIOST 576 Statistical Methods for Survival Data (3) Statistical methods for censored survival data arising from follow-up studies on human or animal populations. Parametric and nonparametric methods, Kaplan-Meier survival curve estimator, comparison of survival curves, log-rank test, regression models including the Cox proportional hazards model, competing risks. Prerequisites: STAT 581 and either 513, STAT 473, or equivalent. Offered: jointly with STAT 576, alternate years.

BIOST 577 Advanced Design and Analysis of Experiments (3) Concepts important in experimental design: randomization, blocking, confounding. Application and analysis of data from randomized blocks designs, Latin and Graeco-Latin squares, incomplete blocks designs, split-plot and repeated measures, factorial and fractional replicates, response surface experiments. Prerequisite: 570 or STAT 421 (minimum 3.0) or permission of instructor. Offered: jointly with STAT 577.

BIOST 578 Special Topics in Advanced Biostatistics (*, max. 3) Advanced-level topics in biostatistics offered by regular and visiting faculty. Prerequisite: permission of instructor. Offered: jointly with STAT 578; AWSpS.

BIOST 579 Advanced Data Analysis (4) Resampling methods; jackknife, bootstrap, cross-validation. Smoothing techniques; local averages; projection-pursuit regression; recursive partitioning regression. Selected aspects of linear regression. Robust-resistant methods. Density estimation. Clustering techniques. The EM-algorithm. Graphical exploratory methods. Prim-81. Prerequisites: 571 and STAT 513 or permission of instructor. Offered: jointly with STAT 579.

BIOST 580 Seminar in Biostatistics (*, max. 9) Presentation and discussion of special topics and research results in biostatistics. Speakers include resident faculty, visiting scientists, and advanced graduate students. Offered: AWSp.

BIOST 586 Martingales: Survival Analysis (3) *Fleming* Theory of counting processes and martingales to provide unified study of survival analysis methods. Focus on survival distribution estimators, censored data rank statistics, regression methods with censored survival data. Development of small samples moments, asymptotic distributions, and efficiencies. Prerequisite: STAT 520 or equivalent. Recommended: 576. Offered: jointly with STAT 586; W.

BIOST 590 Biostatistical Consulting (*) Training in consulting on the biostatistical aspect of research problems arising in the biomedical field. Students, initially under the close supervision of a faculty member, participate in discussions with investigators leading to the design and/or the analysis of a quantitative investigation of a problem. With experience, independent associations of student and research worker are encouraged, with subsequent review by faculty of resulting design and analysis. Prerequisite: permission of instructor. Offered: AWSpS.

BIOST 593 Cancer Prevention Research Laboratory (3) *White* Provides research experience on

cancer prevention projects at the Fred Hutchinson Cancer Research Center. Offered: jointly with EPI 593; AWSpS.

BIOST 800 Independent Study or Research (*) Offered: AWSpS.

BIOST 700 Master's Thesis (*) Offered: AWSpS.

BIOST 800 Doctoral Dissertation (*) Offered: AWSpS.

Environmental Health

F463 Health Sciences

Undergraduate Program

Bachelor of Science Degree

This curriculum focuses on environmental conditions in the community and workplace that adversely affect the health and well-being of people, and the means by which these conditions may be eliminated or controlled. Public health topics include water supply, wastewater disposal, food protection, hazardous waste management, housing, vectors, and epidemiology. Other subject matter covered includes industrial hygiene, toxicology, and environmental health regulation. Graduates from this curriculum have career opportunities in public health, occupational health, environmental protection, and environmental consulting.

Admission Requirements: Junior standing. CHEM 140, 141, 150, 151, 160, 161, 223, 224, 241, 242; BIOL 201, 202, 203; MATH 124; MICROM 301, 302; and PHYS 114, 115, 116.

Graduation Requirements: STAT 311 (or 220); ENGR 333; EPI 420; 40 credits in environmental health, plus one-quarter internship.

Correspondence and Information

Undergraduate Program Director
T329 Health Sciences

Graduate Program

The Department of Environmental Health offers three graduate degrees: Master of Science, Master of Public Health, and Doctor of Philosophy. The areas of emphasis in the graduate programs are: industrial hygiene and safety, toxicology, environmental health technology, and occupational and preventive medicine (M.P.H.).

The Industrial Hygiene and Safety Program (M.S., Ph.D.) focuses on technical and administrative aspects of preventing or controlling occupational illness and injury. Research opportunities include laboratory and field investigations of exposure to health and safety hazards such as toxic chemicals, radiation, and biomechanical stress. Students may elect one of three program options: industrial hygiene, emphasizing recognition, evaluation, and control of exposure to chemical and physical agents; radiological health, emphasizing measurement and control of exposure to ionizing radiation; safety/ergonomics, emphasizing design and assessment of the worker-machine interface.

Students who are interested in the radiological sciences should inquire about the radiological health option in the industrial hygiene program.

The Toxicology Program (M.S., Ph.D.) focuses on research and application of basic scientific principles toward a better understanding of the health effects of toxic substances in the workplace and general environment. Students who select the toxicology option participate in laboratory research on molecular and biochemical processes involved in chemically induced

toxic responses such as soft-tissue (e.g., brain, lung, kidney and liver) damage, birth defects, cancer, and nervous system impairment.

The Environmental Health Technology Program (M.S.) focuses on community problems associated with toxic substances and their control, hazardous waste disposal, and traditional areas of environmental health, such as water and wastewater treatment, food protection, and ambient air quality. Students conduct research on the monitoring and control of hazardous substances and biological agents contaminating surface and ground waters, on human exposure assessment, or on hazardous waste management. This may involve field and laboratory activities.

The M.P.H. Program is for individuals with an earned doctorate. The goal of the program is to provide training in public health sciences with a focus on occupational and environmental health. The program provides didactic instruction and participation in field studies. Research efforts focus on the etiology and prevention of occupational disease. Physicians have the option of also applying for a residency in occupational or preventive medicine.

The Department of Environmental Health cooperates with the Department of Health Services in a three-year, part-time Extended Master of Public Health degree program designed for midcareer public and community health professionals. Students continue their employment, are required to attend one-month summer sessions for three years, and must meet at the University for five weekends during the academic year. The curriculum is designed to provide advanced knowledge and skills for planning, organizing, and evaluating community and environmental health programs.

Admission Requirements

Prerequisites for admission to the M.S. graduate programs in industrial hygiene and safety, toxicology, and environmental health technology include a Bachelor of Science or equivalent degree in environmental health, a physical science, a biological science, or engineering, and submission of Graduate Record Examination scores.

Prerequisite for admission to the M.P.H. program is a doctoral degree.

Prerequisites for admission into the Ph.D. program in environmental and occupational health sciences include a Bachelor of Science degree in science or engineering with adequate preparation in physics, chemistry, mathematics, and biology. Selection of an applicant will also be based upon an honors-level GPA, a statement of personal goals consistent with the program, supportive letters of reference, and high scores on the Graduate Record Examination.

Graduation Requirements

The M.S. and M.P.H. graduate programs are designed for seven quarters of study, including field applications and research, requiring completion of departmental and program specific courses and submission of an acceptable thesis.

The Ph.D. program has a strong research focus, and requires completion of departmental and program specific courses. A dissertation of original research suitable for publication in an appropriate peer-reviewed journal is required. For an entering student with a Bachelor of Science or Engineering degree, the program of study can be expected to take approximately four to five years. A student entering with a Master of Science degree in a relevant area may complete the degree in less time.

Financial Aid

Traineeships and tuition support are available for a limited number of students. This support comes from federal and private sources awarded to the department or school. A few research assistantships are available.

Research Facilities

Specialized laboratories exist for research in industrial hygiene chemistry, ergonomics, trace organics and heavy metals, environmental microbiology, electron microscopy, controlled exposure to environmental factors, toxicology, and radiological sciences. Field research is facilitated through an extensive consultation or service program conducted by this department for labor and industry in Washington State.

Correspondence and Information

Graduate Program Coordinator
Department of Environmental Health, Box 357234
F461 Health Sciences

Faculty

Chair

Gerald van Belle

Professors

Checkoway, Harvey * 1987; MPH, 1975, Yale University; PhD, 1978, University of North Carolina; occupational and environmental epidemiology.

Costa, Lucio Guido * 1983; PharmD, 1977, University of Milan (Italy); neurotoxicology; developmental and molecular mechanisms/biological markers of neurotoxicity.

Eaton, David L. * 1979; PhD, 1978, University of Kansas; biochemical and environmental toxicology, aflatoxin carcinogenesis, metabolism of toxic chemicals.

Faustman, Elaine M. * 1983; PhD, 1980, Michigan State University; developmental toxicology, risk assessment methodologies, toxicology of N-nitroso compounds.

Jackson, Kenneth L. * 1963, (Emeritus); PhD, 1954, University of California (Berkeley); physiological and biochemical mechanisms in radiation biology.

Kalman, David A. * 1978; PhD, 1978, University of Washington; environmental chemistry, detection and fate of chemical hazards in natural and manmade environments.

Koenig, Jane Q. * 1974; MS, 1961, PhD, 1963, University of Washington; respiratory physiology, health effects of air pollutants, lung response of susceptible groups.

Luchtel, Daniel L. * 1973; PhD, 1969, University of Washington; electron microscopy and cell biology; lung anatomy/pathophysiology, fiber toxicology.

Mottet, N. Karle * 1959, (Emeritus); MD, 1952, Yale University; effects of trace elements, especially methylmercury and arsenic, on growth and development.

Omenn, Gilbert S. * 1981; MD, 1965, Harvard University; PhD, 1972, University of Washington; genetic predisposition to environmental and occupational hazards.

Omiecinski, Curtis J. * 1983; PhD, 1980, University of Washington; molecular toxicology, genetic regulation/ expression of drug/chemical metabolizing enzymes.

Robkin, Maurice A. * 1969; PhD, 1961, Massachusetts Institute of Technology; radiation dosimetry, environmental radioactivity, radioactive waste management, health physics.

Rosenstock, Linda * 1980; MD, 1977, Johns Hopkins University; occupational/general internal medicine.

van Belle, Gerald * 1975; MA, 1964, PhD, 1967, University of Toronto (Canada); biostatistics, environmental risk factors for neurodegenerative diseases, risk communication.

Woods, James S. * 1982, (Research); PhD, 1970, University of Washington; MPH, 1978, University of North Carolina; biochemical toxicology of trace metals; biological markers of metal exposure.

Associate Professors

Barnhart, Scott * 1982; MD, 1979, George Washington University; occupationally related lung disease.

Breyse, Peter * 1957, (Emeritus); MS, 1954, Washington State University; MPH, 1957, University of Pittsburgh; exposure of population to contaminants.

Burbacher, Thomas M. * 1974, (Research); PhD, 1983, University of Washington; neurotoxicology, specializing in the behavioral effects of agents on the central nervous system.

Daniell, William E. * 1984; MD, 1979, Tufts University; MPH, 1986, University of Washington; health effects of occupational chemical exposures, multiple chemical sensitivity syndrome.

Fenske, Richard A. * 1990; MA, 1976, MPH, 1978, PhD, 1984, University of California (Berkeley); human exposure and health risk assessment, pesticide exposure.

Franklin, Gary M. * 1988, (Research); MD, 1969, George Washington University; MPH, 1982, University of California (Berkeley); occupational injury, neurological epidemiology, public health nutrition.

Geraci, Joseph P. 1972; MS, 1969, PhD, 1972, University of Washington; radiation biology, physiological mechanisms of radiation induced liver injury.

Guffey, Steven E. * 1987; PhD, 1987, University of North Carolina; industrial ventilation design, modeling of pressure and flow relationships, hood design research.

Hatlen, Jack B. * 1952, (Emeritus); MS, 1958, University of Washington; environmental health program planning and management, environmental health manpower training.

Kavanagh, Terrance J. * 1989, (Research); MS, 1980, PhD, 1985, Michigan State University; free radical toxicology, glutathione metabolism, toxicology and aging.

Morgan, Michael S. * 1974; DSc, 1972, Massachusetts Institute of Technology; applied respiratory, physiology and inhalation toxicology.

Nevissi, Ahmad * 1973, (Research); MS, 1966, University of Hannover (Germany); PhD, 1973, University of Arkansas; radiochemistry.

Wiker, Steven F. * 1993; MS, 1981, George Washington University; MS, 1982, PhD, 1986, University of Michigan; ergonomics and human factors engineering.

Assistant Professors

Brodtkin, Carl * 1989; MD, 1983, University of Colorado (Denver); hepatic effects of occupational solvent exposure; ventilatory decline in asbestos-exposed workers.

Keifer, Matthew C. * 1987; MD, 1982, University of Illinois; the human health effects of pesticide exposure.

Kissel, John C. * 1990; MS, 1974, Harvard University; PhD, 1985, Stanford University; solid and hazardous waste management practice, human exposure assessment.

Samadpour, Mansour * 1995; MS, 1987, PhD, 1990, University of Washington; molecular epidemiology of microbial pathogens, bacterial population genetics and pathogenesis.

Seixas, Noah S. * 1992; MS, 1982, Harvard University; PhD, 1990, University of Michigan; exposure assessment methods for occupational/epidemiologic studies; small industrial plants.

Sheppard, Elizabeth A. * 1989, (Research); MSc, 1985, Johns Hopkins University; PhD, 1992, University of Washington; aggregate data, survival analysis, biostatistical methods in environmental health.

Yost, Michael G. * 1993; MS, 1984, PhD, 1989, University of California (Berkeley); worker exposures to physical agents, electromagnetic fields, noise and vibration.

Senior Lecturers

Monteith, Lee E. 1981; MS, 1956, University of Washington; industrial hygiene, analytical and environmental chemistry.

Morris, Sharon L. 1982; BA, 1965, Reed College; occupational safety and health policy, continuing education.

Treser, Charles D. 1980; MPH, 1976, University of Michigan; policy analysis and decision making, program planning and evaluation, environmental education.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

ENV H 311 Introduction to Environmental Health (3) *Treser* Relationship of people to their environment, how it affects their physical well-being and what they can do to influence the quality of the environment and to enhance the protection of their health. Emphasis on environmental factors involved in transmission of communicable diseases and hazards due to exposure to chemical and physical materials in our environment. Offered: ASp.

ENV H 343 Environmental Radioactivity (3) *NW Woodruff* Sources of radioactivity in the environment, including both natural sources, especially radon, and manmade sources, especially nuclear power and nuclear explosions. Emphasis given to methods for determining radiation doses from the significant sources. Offered: jointly with ENGR/PHYS 343; Sp.

ENV H 405 Toxic Chemicals in the Environment (3) *Eaton* Basic principles governing the behavior and effects of toxic chemicals released into the environment; sources, distribution, and fate of toxic chemicals in the environment; chemicals and cancer; chemicals and birth defects; government regulation of chemical hazards. Prerequisites: BIOL 203, or BIOC 405, 406 or equivalent. Offered: Sp.

ENV H 415 Nuclear Instruments (3) *Nevissi, Robbin* Principles, measurements, and detection of various types of radiation encountered in nuclear energy systems. Use of Geiger, proportional, and scintillation detectors; ionization chambers; analog-digital data-logging equipment; multichannel analyzers. Prerequisite: junior standing. Offered: W.

ENV H 417 Nonionizing Radiation and Electrical Safety (2) *Yost* Introduction to health hazards from UV, optical laser hazards, infrared radiation, radio-frequency radiation, heat stress, electrical shock, electric and magnetic fields. Application of current standards for these physical agents. Emphasis on occupational hazards with additional discussion of environmental exposures where appropriate. Offered: odd years, W.

ENV H 430 Methods in Environmental Sampling and Analysis (3) *Samadpour* Field sampling methods are studied and selected laboratory analyses of food, drinking water, and waste waters are conducted. Official methods for characterizing physical and chemical quality of water and wastes are demonstrated. Microbiological criteria are emphasized for student participation, including: enumeration of subgroups in populations, selective inhibitor, characteristics of normal flora, rationale of "indicator" organisms. Prerequisites: junior standing, 440, MICROM 301 and 302, and permission of instructor. Offered: Sp.

ENV H 440 Water and Waste Sanitation (4) *Hatten* Study of health problems associated with drinking water and wastewaters and minimization of problems. Focus on drinking water quality and quantity requirements; water pollutants and impacts on environment; individual drinking water, onsite sewage fa-

cilities, related site selection criteria/regulations, regulatory agency activities. Field performance of environmental health specialist emphasized. Offered: A.

ENV H 441 Food Protection (3) *Hatten* Study of identification and characteristics of chemicals and biological agents implicated in foodborne disease outbreaks and conditions or circumstances by which food contamination occurs. Examination of food protection activities conducted by local and state government at the retail level. Prerequisite: MICROM 301 or permission of instructor. Offered: W.

ENV H 442 Vector Control and Housing (3) *Treser* Study of the impact and control of rodents and arthropod vectors of disease, including consideration of economic poisons used, their regulation, and safety measures. Housing practices and conditions affecting health in residential (private and multiple dwelling) and institutional (schools and hospitals) settings are examined and control measures reviewed. Offered: Sp.

ENV H 445 Solid Waste Management (3) Examination of the public health, environmental, economic, and materials conservation aspects of solid wastes management; amounts and sources of solid wastes, waste reduction and recycling, methods of storage, transportation and disposal, integrated waste management, identification of present problems and future needs. Prerequisite: environmental health major or permission of instructor. Offered: W.

ENV H 446 Hazardous Waste Management (3) *Kissel* Characterization of hazardous wastes and introduction to pertinent federal and state regulations. Discussion of exposure pathways and description of management options at pre-generation, pre-release, and post-release stages. Emphasis on public health significance. Supplemented with case studies. Prerequisite: environmental health major or permission of instructor. Offered: Sp.

ENV H 449 Respiratory Effects of Air Pollution (2) *Koenig* Structure and function of the respiratory system and the changes that may be produced by specific air pollutants, such as ozone, SO₂. Air quality criteria and the economic costs of disease are discussed. Several classroom demonstrations. Prerequisite: sophomore standing. Offered: odd years; Sp.

ENV H 453 Exposure Assessment for Occupational and Environmental Health (3) *Fenske* Introduction to basic principles of human exposure assessment in workplace and community environments. Exposure assessments are essential for determining disease etiology and for characterizing health risks within a risk assessment framework. Examination of recent advances in the field, many of which have altered environmental health priorities. Offered: A.

ENV H 454 Industrial Hygiene Sampling and Instrumentation (2) *Breyse* Series of lectures and laboratory demonstrations illustrate the use of a wide spectrum of industrial hygiene sampling equipment. Included are airflow calibration, chemical calibration, detector tubes, personnel sampling devices, both continuous and discrete reading instruments. Instrumentation for noise and electromagnetic radiation. Prerequisite: 453. Offered: Sp.

ENV H 457 Industrial and Environmental Noise (3) *Yost* Survey of industrial and community noise problems, including sources, effects, measurement, control, and legislation. Offered: Sp.

ENV H 481 Air Pollution Control (3) *Pilat* Fundamental concepts of air pollution. Emission sources, atmospheric dispersion, ambient concentrations, adverse effects, governmental regulations, emission standards, air-quality standards, processes and equipment for controlling emissions. Prerequisite: senior standing. Offered: jointly with CIVE 490; A.

ENV H 470 Environmental Health Practice: Administration and Management (2) *Treser* Explores selected aspects of the management of environmental

health programs in the community, including organization theory and practice, budgeting, personnel management, program planning and evaluation, and community relations. Prerequisite: environmental health major or permission of instructor. Offered: A.

ENV H 471 Environmental Health Regulation (2) *Treser* Introduction to administrative regulation and process. Authority, jurisdiction, and structure of environmental control programs and agencies; the regulatory process; agency acquisition and retention of information; administrative actions; enforcement of environmental health laws; major statutes and cases affecting programs. Prerequisite: environmental health major or permission of instructor. Offered: W.

ENV H 472 Environmental Risk and Society (3) *Fenske* Examines scientific determinations of environmental risks and explores how such determinations are evaluated by affected communities and society. Employs risk analysis to integrate technical knowledge in hazard identification and exposure assessment to provide a more rational basis for environmental policies. Also discusses public participation in risk-based decisionmaking. Offered: W.

ENV H 479 Environmental Research Design (1) Designed to assist in the development of environmental health research projects. Common research designs, methodology, principles, and problems with emphasis on effective research problem definition, implementation, and data presentation. Offered: W.

ENV H 480 Environmental Health Problems (*, max. 6) *Treser* Individual projects involving library, laboratory, or field study of a specific environmental health problem. Prerequisite: environmental health major or permission of instructor. Offered: AWSpS.

ENV H 482 Environmental Health Internship (3-15) *Treser* Assignment to an environmental health or environmental protection agency for supervised observation and experience in environmental health technology, program planning and utilization of community resources. Prerequisite: environmental health major or permission of departmental adviser. Credit/no credit only. Offered: AWSpS.

ENV H 497 Environmental Health Special Electives (*) Offered: AWSpS.

ENV H 499 Undergraduate Research (*) Individual research on a specific topic in environmental health upon which specific conclusions, judgments, or evaluation can be made or upon which facts can be presented. Prerequisite: environmental health major or permission of instructor. Offered: AWSpS.

Courses for Graduates Only

ENV H 511 Environmental and Occupational Health (3) Effects of exposure to chemical, physical, and biological agents, using a problem-oriented approach embracing the community and workplace environments. Current issues, using specific cases from recent literature as basis for classroom discussion and written assignments. One section each year plus one physician-only section even years. Offered: W.

ENV H 512 Hazardous Waste Management Technology (3) Lecture and field study covering the role, design concepts, and capabilities of environmental technologies used in waste management, industrial, and related facilities. Lecture sessions, field site visits with site visit technical reports, and class paper addressing relevant topic in detail. Recommended: 446. Offered: S.

ENV H 514, 515, 516 Environmental and Occupational Toxicology I, II, III (3, 3, 3) *Costa, Luchtel, Omiecinski* Major topical areas in human and environmental toxicology, including the biochemical, cellular, and physiological mechanisms by which chemicals produce toxic responses; the toxicology of the major classes of chemicals; principles of toxicity testing; interpretation of toxicological data. Prerequisites:

BIOL 212, BIOC 440, or permission of instructor. Offered: A, W, Sp.

ENV H 517 Methods and Applications of Genetic Epidemiology (3) *Austin* Research methods for evaluating genetic influences on disease, risk factors. Study designs, statistical methods include twin studies, family studies, population-based association studies, complex segregation analysis, allele-sharing methods, linkage analysis. Prerequisites: EPI 512, 513; BIOC 511, 512, 513; background in human genetics or equivalent basic genetics course. Offered: jointly with EPI 517; even years, W.

ENV H 520 Biological Effects of Ionizing Radiation (3) *Geraci* Effects of ionizing radiation at the molecular, cellular, organ, and organism levels with emphasis on mammalian systems. Offered: S.

ENV H 521 Laboratory in Radiation Biology (1) *Geraci* Laboratory study of the biological effects of ionizing radiation. Prerequisite: 520, permission of instructor. Offered: A.

ENV H 522 Laboratory in Radiation Biology (1) *Geraci* Laboratory study of the biological effects of ionizing radiation. Prerequisite: 520, 521, permission of instructor. Offered: W.

ENV H 524 Radioactive and Chemical Wastes (3) *Nevissi* Fate and effects of mixed radioactive and hazardous waste in the environment are discussed. Topics are: the generation, storage, disposal, environmental transport, pathways to humans, and evaluation of health effects of mixed wastes. Also includes: waste disposal at sea, and the current status and future trends in mixed waste disposal. Offered: Sp.

ENV H 525, 526 Physical Radiation Dosimetry I, II (3, 3) *Robkin* Physical basis of the dosimetry of ionizing radiation. Includes consideration of radiation sources, interactions with inert matter and living tissue, internal and external radiation exposure, radiation detection and measuring instruments, biological effects, radiation protection standards, and the statistics of radioactivity measurement.

ENV H 527 Radiation Hazards Analysis and Control (1) *Addison* Emphasizes methods and procedures rather than facility or equipment design. Offered: Sp.

ENV H 528 Physical Aspects of Medical Imaging (4) *Stewart* Quantitative physical principles of medical imaging are presented for electromagnetic and ultrasonic radiation. Methods of radiation generation and image formation are discussed for conventional projection radiography, Computed Radiography, CT B-mode and Doppler Ultrasound, Nuclear Medicine, SPECT, PET, and Magnetic Resonance Imaging. Offered: jointly with RADGY/BIOEN 508; W.

ENV H 529 Environmental Impact of Radioactivity (3) *Robkin* Dispersion, fate, and environmental significance of radioactivity released into environment. Assessment of environmental impact of radioactivity releases; impact of mixtures of radioactivity and chemicals. Laboratory setting permits evaluation of release and impact events with personal computer versions of state-of-the-art environmental assessment and radiation dosimetry codes. World environmental contamination problems addressed. Offered: Sp.

ENV H 531 Neurotoxicology (3) *Costa* Advanced discussions of the principles and methodological approaches to neurotoxicology (including behavioral toxicology), classes of neurotoxic agents, types and mechanisms of neurotoxic effects, as well as the role of neurotoxicology in toxicology and public health. Prerequisite: 514, 515 or 405 or permission of instructor. Offered: even years; W.

ENV H 532 Reproductive and Developmental Toxicology (2) *Faustman* Investigates chemicals that can induce adverse reproductive and developmental outcomes. Discussion topics include identifica-

tion and characterization of specific classes of toxic agents, mechanisms of action of these agents at the molecular and cellular level, and risk assessment and regulatory issues. Prerequisite: 514 and 515 or 405 or permission of instructor. Offered: even years; S.

ENV H 533 Molecular Toxicology (2) *Kavanagh, Omiecinski* Advanced discussion of molecular mechanisms whereby chemical, physical, and biological agents produce their harmful effects on biological tissues. Prerequisites: permission of instructor. Offered: jointly with PHCOL 533; even years; Sp.

ENV H 535 Inhalation Toxicology (2) *Koenig, Lucht* Advanced course on the toxicology of air pollutants and the response of the respiratory system to inhaled gaseous and particulate toxicants. Issues and concepts covered include biology of the respiratory system, exposure technology, experimental design and methodological issues, health effects of air pollutants, and regulatory aspects. Prerequisites: 514-516, or 405 or permission of instructor. Offered: even years; Sp.

ENV H 545 Drinking Water and Health (3) Principles, requirements of public water supply for protection of public health. Includes essential characteristics of water quality and sources, water treatment and distribution systems with associated health hazards; public health engineering, epidemiology, risk assessment; surveillance, regulatory needs to assure safe public water supplies. Prerequisite: 440 or CIVE 351 or permission of instructor. Offered: Sp.

ENV H 548 Pesticides and Public Health (3) *Fenske* Examines health risks and benefits associated with pesticide use in the United States and internationally; reviews exposure, toxicity, epidemiology, and regulation of pesticides, focusing on populations such as workers and children; discusses benefits derived from vector control, food production, and food preservation. Offered: W.

ENV H 550 Microscopy: Image Acquisition and Analysis (2) *Lucht* Sample preparation methods, principles and practical aspects of light microscopy (bright-field, phase, differential interference, polarizing, and confocal), electron microscopy (transmission, scanning, electron diffraction, and energy dispersive x-ray analysis), photographic and digital imaging, computerized image analysis techniques. Student research project required. Prerequisite: permission of instructor. Offered: Sp.

ENV H 552 Environmental Chemistry of Pollution (3) *Kalman, Kissel* Chemical and physical processes determining distribution and fate of chemical hazards, detection of low levels of hazardous compounds, and environmental evaluation and prediction. Fundamental chemical concepts and measurable properties of individual compounds to interpret and relate measurements. Prerequisite: admission to graduate program or permission of instructor. Offered: W.

ENV H 553 Instrumental Methods for Industrial Hygiene Measurement: Lecture (3) *Morgan* Strategy, methods, instrumentation, and theory of atmospheric sampling and analysis, emphasizing evaluation of potential occupational hazards and exposures to chemical agents. Prerequisite: 453 or permission of instructor. Offered: W.

ENV H 555 Instrumental Methods for Industrial Hygiene Measurement: Laboratory (3) *Monteith* Utilizes typical instrumental techniques and analytical methods for the evaluation of potential occupational exposures. Prerequisites: 453 and 553 or permission of instructor. Offered: Sp.

ENV H 556 Quantitative Occupational Exposure Analysis (3) *Morgan, Seixas* Exploration of industrial hygiene data to understand nature of airborne exposures in the occupational environment, and their interpretation for human health. Focus on reading and discussion of primary exposure assessment literature

and statistical analysis of real dataset. Prerequisite: one quarter of statistics or biostatistics and basic industrial hygiene. Offered: A.

ENV H 557 Industrial Ventilation I (3) *Guffey* Principles of exhaust ventilation systems, design for contaminant control in industry. Offered: W.

ENV H 558 Industrial Ventilation II (3) *Guffey* Troubleshooting and redesign of existing exhaust ventilation systems for contaminant control. Includes measurement laboratories. Prerequisite: 557 or permission of instructor. Offered: Sp.

ENV H 559- Applied Industrial Hygiene (2-, max. 4) *Camp* Application of occupational safety and health principles through a combination of field investigations and classroom discussions. Teams conduct walkthrough evaluations, environmental sampling, exposure assessment, review of current health and safety programs, and development of control strategies to eliminate or reduce hazards at one or more local worksites. Extends over two quarters. Prerequisite: 453 or equivalent. Offered: AW.

ENV H 560 Organizing and Administering Industrial Safety and Health Programs (4) *Freeman* Explores industrial organization and methods of integrating safety and industrial hygiene programs with industrial operations. Philosophic issues related to industrial safety and health such as responsibility for safety, dependency on safe practice, and hierarchy of prevention are investigated. Contains numerous case problems and student involvement opportunities. Offered: A.

ENV H 562 Technical Aspects of Safety and Health (3) *Wiker* Explores specific hazards associated with major industries, as well as hazards common to all industries. Machine guarding, electrical safety, systems safety analysis, materials handling, and working at heights are among the subjects covered. Offered: A.

ENV H 564 Recognition of Health and Safety Problems in Industry (2) *Freeman, Seixas* Develops skills in occupational health and safety hazard recognition in a variety of important northwest industries. Focuses on process understanding and hazard recognition skills during walk-through inspections of several local facilities, stressing a multidisciplinary approach. Offered: A.

ENV H 566 Introduction to Ergonomics (3) *Wiker* Basic principles of ergonomics in work environment applied to problems of worker and management. Topics include measurement of physical work capacity, problems of fatigue and heat stress, applied biomechanics, worker-machine interactions and communication, design of displays and controls. Prerequisite: basic human physiology or permission of instructor. Offered: W.

ENV H 567 Environmental Carcinogenesis (3) *Eaton* Biochemical and molecular basis of carcinogenesis induced by chemical and physical agents in the environment, including detailed discussion of multi-stage process of carcinogenesis, mechanisms of action of specific chemical and physical carcinogens; current approaches to identification of carcinogens, and chemoprevention strategies. Prerequisite: 514 and 515 or 405 or permission of instructor. Offered: W.

ENV H 568 Molecular Epidemiology of Infectious Diseases (2) Application of molecular typing techniques to study of microbial pathogens to increase understanding of epidemiology of infectious diseases. Brief review of molecular biology. Evaluation of methods used in outbreaks and epidemics reported in literature. Prerequisites: 511 or 512 or permission of instructor. Offered: jointly with EPI/PABIO 568; W.

ENV H 569 Occupational Biomechanics (4) *Wiker* Lectures and laboratories address human occupational biomechanical and physiological limits and measurement, analysis, and modeling techniques that are

used by ergonomists for design of safe, healthful, and productive physical work. Prerequisites: 566 or permission of instructor. Offered: jointly with IND E 569, Sp.

ENV H 570 Occupational and Environmental Epidemiology (3) *Checkoway* Research in occupational and environmental determinants of disease. Defining exposed populations, characterizing exposure levels, estimating disease risks relative to exposure. Cohort, case-control, cross-sectional designs for various health outcomes. Applications to exposure standard setting and risk assessment. Prerequisite: EPI 511 or EPI 512, 513 or permission of instructor. Offered: jointly with EPI 570; W.

ENV H 572 Clinical Occupational Medicine (3) *Brodtkin* Comprehensive overview of clinical occupational medicine. Introduction to principles of occupational disease, occupational history taking, and health care providers' involvement in workers' compensation. Epidemiologic evidence and pathophysiologic basis for occupational diseases reviewed emphasizing approaches to diagnosis and management of occupational diseases based on organ systems. Prerequisite: MD degree, Environmental Health graduate student, Occupational Health Nursing student, or permission of instructor. Offered: A.

ENV H 573 Methods and Issues in Using Biological Measurements in Epidemiologic Research (2) Introduction to use of measurements from biological specimens in epidemiologic studies. Prepares epidemiology and laboratory science students for conduct of interdisciplinary human studies. Evaluation of biomarkers, preliminary studies, methodologic issues, quality control. Brief review of molecular biology. Applications and current literature discussed. Prerequisites: EPI 511 or 512. Offered: jointly with EPI 573; W.

ENV H 577 Risk Assessment for Environmental Health Hazards (3/4) *Faustman, Ormnn* Examines context, methodologies, data, uncertainties, and institutional arrangements for risk assessment. Qualitative and quantitative approaches to identification, characterization, and control of environmental hazards to health emphasized through didactic and case studies. Prerequisite 515 and BIOT 511 or permission of instructor. Offered: jointly with CEWA/PB AF 577; A.

ENV H 580 Environmental Health Seminar (1, max. 8) Presentation of current environmental health research and environmental and public health issues. Credit/no credit only. Offered: AWSp.

ENV H 581 Environmental Health Reading I (1) *Burbacher, Luchtel* Critical reading of selected basic and applied research publications on environmental health problems and programs. Offered: A.

ENV H 582 Environmental Health Reading II (1) *Koenig, Luchtel* Discussion of controversial and current issues facing public health and the environmental health professional. Offered: W.

ENV H 583 Environmental Health Reading III (1) *Burbacher, Koenig* Preparation and presentation of masters thesis proposal. Offered: Sp.

ENV H 584 Occupational Health and Safety: Policy and Politics (3) *Camp, Morris, Silverstein* Designed to provide a better understanding of the historical, political, and policy issues in occupational health and safety through selected readings and discussion with experts in the field. Particular emphasis on the Occupational Safety and Health Act. Students prepare and present an analysis of an occupational health policy issue. Offered: Sp.

ENV H 580 Selected Topics (1-6) In-depth study of a current environmental health topic. For more information and permission, consult department program adviser. Offered: AWSp.

ENV H 591 Current Topics in Toxicology (1, max. 6) *Faustman, Kavanagh* Provides in-depth exami-

nation of current topics in environmental and occupational toxicology taken from recently published journal articles. Consists of presentations led by students, postdoctoral fellows, and faculty. Students expected to participate actively in discussion. Assigned weekly readings given according to the schedule of speakers and topics. Offered: AWSp.

ENV H 593 Current Topics in Risk Assessment (1) *Faustman, Gilbert* Provides examination of current topics in risk assessment and risk communication with a particular focus on issues in environmental health. Consists of presentations led by students, postdoctoral fellows, and faculty. Students expected to participate actively in discussion and possibly write a short paper. Assigned reading given according to the schedule of speakers and topics. Offered: W.

ENV H 595 Research Rotation (3, max. 9) Research laboratory rotation for predoctoral graduate students. Students commit to a laboratory research project aimed at introducing the student to current methods in laboratory research, and to familiarize the student with specific faculty research interests. Prerequisites: graduate standing and permission of program director. Offered: AWSp.

ENV H 599 Field Studies (2-6) Assignment to an environmental research or service program to develop field research and evaluation skills. Credit/no credit only. Offered: AWSp.

ENV H 600 Independent Study or Research (*) Prerequisite: permission of departmental adviser. Offered: AWSp.

ENV H 700 Master's Thesis (*) Prerequisite: permission of departmental adviser. Offered: AWSp.

ENV H 800 Doctoral Dissertation (*) Prerequisite: permission of departmental adviser. Credit/no credit only. Offered: AWSp.

Epidemiology

F263 Health Sciences

Graduate Program

The Department of Epidemiology offers three graduate degrees in the field of epidemiology for individuals intending to become academicians, highly qualified research specialists, or well-trained practitioners. The Master of Public Health degree requires course work in health services and environmental health in addition to epidemiology, thesis research, and a practicum. The Master of Science degree requires concentration on courses and research in epidemiology as preparation for technical specialization or as a prelude to the Doctor of Philosophy program. The Ph.D. course requirements differ from the M.S. program requirements primarily in the scope and complexity of research for the dissertation. Course work includes a basic series in epidemiology, biostatistics, and electives in chronic disease, infectious disease, and methodology. The department also offers postdoctoral research training and a two-year residency in general preventive medicine with emphasis on epidemiology for physicians.

Special Requirements

M.P.H. applicants who hold an M.D., D.V.M., D.D.S., or Ph.D.; possess a bachelor's and health-related background; or seek a combined M.D./M.P.H. are considered. M.S. applications are welcomed from outstanding bachelor-level graduates, physicians, and other health professionals. Ph.D. applicants with prior master- or doctoral-level training in a health-related field, equivalent postbaccalaureate experience, or who anticipate earning a joint M.D./Ph.D. are preferred.

Financial Aid

Research training stipends are available on a limited basis. Opportunities for work on various research projects or for aid in teaching may provide partial assistance.

Research Facilities

University facilities include well-equipped laboratories, an excellent library system, and access to computers. Various opportunities for field research are provided in Seattle and elsewhere in the state, including the Fred Hutchinson Cancer Research Center, Group Health Cooperative's Center for Health Studies, the Harborview Injury Prevention and Research Center, the Seattle-King County Department of Public Health, and several other local hospitals and health institutions.

Correspondence and Information

Emily White, Graduate Program Coordinator
Department of Epidemiology, Box 357236

Faculty

Chair

Thomas D. Koepsell

Professors

Alexander, E. Russell * 1990; MD, 1953, University of Chicago; infectious disease epidemiology and infectious disease of children.

Austin, Melissa A. * 1988; PhD, 1985, University of California (Berkeley); genetic epidemiology of lipoproteins, coronary heart disease and cancer.

Becker, Thomas 1995; MA, 1976, University of New Mexico; MD, 1981, Case Western Reserve University; PhD, 1986, University of New Mexico; cancer, sexually transmitted diseases and health issues of Native American populations.

Checkoway, Harvey * 1987; MPH, 1975, Yale University; PhD, 1978, University of North Carolina; occupational and environmental epidemiology.

Connell, Frederick A. * 1978, (Adjunct); MD, 1972, New York University; maternal and child care, health services.

Daling, Janet R. * 1979; PhD, 1977, University of Washington; maternal and child health and cancer research.

Davis, Scott * 1980; PhD, 1980, University of Washington; cancer epidemiology, disease etiology.

Di Giacomo, Ronald F. * 1974, (Adjunct); DVM, 1965, University of Pennsylvania; MPH, 1974, University of Washington; epidemiology and zoonoses.

Eisenberg, Mickey * 1975, (Adjunct); MD, 1971, Case Western Reserve University; PhD, 1978, University of Washington; sudden cardiac arrest and acute myocardial infarction.

Emanuel, Irvin * 1966; MD, 1960, University of Rochester; child development and mental retardation.

Foy, Hjordis * 1967; MD, 1953, Karolinska Institute (Sweden); PhD, 1968, University of Washington; epidemiology and control of infectious disease.

Gale, James L. * 1969; MD, 1961, Columbia University; MS, 1969, University of Washington; epidemiology and control of infectious disease, international health, public health practice.

Gates, George A. 1993, (Adjunct); MD, 1959, University of Michigan; otology/neurology, cochlear implantation.

Grayston, J. Thomas * 1960; MD, 1948, University of Chicago; epidemiology and control of infectious disease.

Handsfield, Hunter 1979, (Adjunct); MD, 1968, Columbia University; infectious diseases.

Henderson, Maureen M. * 1975; MBBS, 1949, DPH, 1956, University of Durham (UK); epidemiology of chronic diseases, dietary prevention of disease.

Hickok, Durlin E. * 1974, (Clinical); MD, 1973, University of Michigan; perinatal epidemiology.

Holmes, King K. * 1969, (Adjunct); MD, 1963, Cornell University; PhD, 1967, University of Hawaii; clinical epidemiology and pathogenesis of infectious diseases.

King, Mary-Claire 1995, (Adjunct); PhD, 1973, University of California (Berkeley); human genetics.

Koepsell, Thomas D. * 1979; MD, 1972, Harvard University; MPH, 1979, University of Washington; chronic diseases, applying epidemiologic concepts to medical practice.

Kreiss, Joan K. * 1984; MD, 1978, Washington University; MPH, 1984, University of California (Los Angeles); epidemiology of AIDS, particularly in Africa.

Lee, John A. H. * 1966, (Emeritus); DPH, 1952, London School of Hygiene & Tropical Medicine; MD, 1955, University of Edinburgh (UK); epidemiology of neoplastic disease.

Longstreth, W. T. Jr. 1977, (Adjunct); MD, 1975, University of Pennsylvania; MPH, 1982, University of Washington; neurology.

Marcuse, Edgar K. 1973, (Adjunct); MD, 1967, Stanford University; MPH, 1973, University of Washington; general pediatrics.

Moolgavkar, Suresh H. * 1984; MBBS, 1966, Bombay University (India); PhD, 1973, Johns Hopkins University; cancer epidemiology, development of quantitative methodology.

Perine, Peter L. * 1981; MD, 1966, University of Kansas; MPH, 1973, University of Washington; international health, sexually transmitted diseases.

Potter, John D. 1995; MBBS, 1971, PhD, 1984, University of Queensland (Australia); cancer epidemiology and prevention.

Rivara, Frederick P. * 1984, (Adjunct); MD, 1974, University of Pennsylvania; pediatric epidemiology and injury prevention and research.

Shy, Kirkwood K. * 1979, (Adjunct); MD, 1973, Wayne State University; epidemiologic applications to problems in obstetrics and gynecology.

Stamm, Walter E. * 1976, (Adjunct); MD, 1971, Harvard University; infectious disease.

Thomas, David B. * 1979; MD, 1963, University of Washington; DPH, 1972, Johns Hopkins University; cervix and breast carcinoma epidemiology.

Weiss, Noel S. * 1975; MD, 1967, Stanford University; DPH, 1971, Harvard University; chronic disease epidemiology.

White, J. Emily * 1982; PhD, 1982, University of Washington; cancer epidemiology and prevention.

Worthington-Roberts, Bonnie S. * 1973; PhD, 1971, University of Washington; maternal and child nutrition.

Associate Professors

Alderman, Beth W. * 1989, (Research); MD, 1981, University of Chicago; MPH, 1984, University of Washington; birth defect epidemiology; epidemiology methods; clinical epidemiology.

Beresford, Shirley A. * 1987; PhD, 1981, University of London (UK); cancer prevention, especially dietary factors; diet and exercise in disease prevention.

Boyko, Edward J. * 1989, (Adjunct); MD, 1979, University of Pittsburgh; epidemiology of inflammatory bowel disease and non-insulin-dependent diabetes mellitus.

Chu, Joseph * 1982; MD, 1975, Georgetown University.

Dugowson, Carin E. 1979, (Adjunct); MD, 1976, University of Illinois; MPH, 1986, University of Washington; rheumatology.

Hoover, J. Joanne * 1972, (Research); MD, 1960, University of Illinois; MPH, 1972, University of Washington; cardiovascular epidemiology, public health practice.

Kimball, Ann M. 1993; MD, 1976, MPH, 1981, University of Washington; maternal and child health, HIV/AIDS, international health.

Koutsky, Laura A. * 1989; PhD, 1987, University of Washington; sexually transmitted diseases, including HIV-AIDS and HPV.

Kristal, Alan R. * 1987; DPH, 1983, Columbia University; nutritional epidemiology, dietary behavior, nutrition intervention, and cancer control.

Kukuli, Walter A. * 1985; PhD, 1984, University of Washington; Alzheimer's disease; epidemiologic methods; chronic disease epidemiology.

LaCroix, Andrea Z. * 1989; PhD, 1984, University of North Carolina; epidemiology of aging.

Martin, Diane P. * 1973, (Adjunct); MA, 1972, Temple University; PhD, 1979, University of Washington; health services use and cost, alternative delivery systems and insurance.

Moore, Donald E. 1977, (Adjunct); MD, 1967, Case Western Reserve University; reproductive endocrinology.

Mueller, Beth A. * 1984; DPH, 1984, Tulane University; epidemiology of perinatal and reproductive diseases, cancer, and injury research.

Pendergrass, Thomas W. 1978, (Adjunct); MD, 1971, University of Tennessee; MPH, 1979, University of Washington; hematology, oncology.

Psaty, Bruce M. * 1984; PhD, 1979, MD, 1981, Indiana University; cardiovascular disease, coronary heart disease, hypertension, and pharmacoepidemiology.

Siscovick, David S. * 1987; MD, 1976, University of Maryland; epidemiology.

Stanford, Janet L. * 1986; PhD, 1986, Johns Hopkins University; chronic disease epidemiology including cancer and cardiovascular disorders; biochemical epidemiology.

Stehr-Green, Paul 1995; DPH, 1982, University of Pittsburgh; public health and national childhood immunization.

Vaughan, Thomas L. * 1982; MD, 1978, University of Illinois; MPH, 1983, University of Washington; cancer, maternal and child health, environmental epidemiology.

Assistant Professors

Astley, Susan J. * 1992; PhD, 1990, University of Washington; chronic childhood diseases.

Cheney, Carrie L. * 1990, (Affiliate); PhD, 1989, University of Washington; role of nutrition in cancer prognosis and secondary prevention.

Critchlow, Cathy W. 1993; PhD, 1993, University of Washington; epidemiology in dental health, chronic disease as affected by infectious disease.

Cummings, Peter 1993; MD, 1970, Case Western Reserve University; MPH, 1993, University of Washington; pediatric emergency medicine, injury prevention and treatment.

Davis, Robert L. 1991; MD, 1983, University of California (San Diego); MPH, 1993, University of Washington; general pediatrics.

Farrow, Diana C. 1991; MA, 1985, PhD, 1989, University of Washington; cancer etiology, dietary risk factors, access to health care.

Goldbaum, Gary M. * 1989; MD, 1978, University of Colorado (Denver); MPH, 1989, University of Washington; the epidemiology of human behaviors that increase risk for disease.

Haselkorn, Jodie K. * 1985, (Adjunct); MD, 1985, Louisiana State University; health services for the disabled; diagnostic accuracy of tests, effectiveness of interventions.

Heckbert, Susan R. * 1990; MD, 1981, Case Western Reserve University; MPH, 1987, PhD, 1990, University of Washington; outcomes of drug therapy, susceptibility to cancers.

Holt, Victoria L. * 1991; MPH, 1987, PhD, 1990, University of Washington; reproductive health epidemiology, impact of prenatal care and perinatal technology.

Jarvik, Gail P. 1991, (Adjunct); MS, 1983, PhD, 1986, University of Michigan; MD, 1987, University of Iowa; medical genetics.

Kestin, Mark * 1990; PhD, 1989, Flinders University (Australia); MPH, 1990, Harvard University; relationship between nutrition, cancer and cardiovascular disease.

Reiber, Gayle * 1991; MPH, 1975, Johns Hopkins University; PhD, 1989, University of Washington; epidemiology and health services research on preventing complications of diabetes.

Schwartz, Stephen M. * 1990; PhD, 1990, University of Washington; cancer epidemiology, neuroepidemiology, reproductive epidemiology, epidemiologic methods.

Stevens, Nancy G. * 1982, (Adjunct); MD, 1979, University of Washington; family medicine.

Williams, Michelle A. * 1991; ScD, 1991, Harvard University; reproductive and perinatal epidemiology, cancer epidemiology.

Wolf, Marsha E. * 1988; PhD, 1988, University of Washington; injury epidemiology and older adults.

Instructor

Lavreys, Ludo J. D. 1995, (Acting); MD, 1986, Catholic University of Leuven (Belgium); research in AIDS, STD and primary health care.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

EPI 420 Introduction to Epidemiology (3) NW For the undergraduate student wishing to devote only one quarter to a course in epidemiologic methods. Description of ways in which variation in disease occurrence is documented and how that variation is studied to understand causes of disease. Offered: A.

EPI 497 Epidemiology Special Electives (*) Off-campus course for medical students. Prerequisite: permission of adviser. Offered: AWSpS.

EPI 499 Undergraduate Research (*) Prerequisite: permission of adviser. Offered: AWSpS.

Courses for Graduates Only

EPI 501 Public Health Practice at the Local Level (3) History and development of local and state public health departments. Traditional vs. new roles and critical interactions with public, private agencies highlighted. Examples drawn from areas of current concern (e.g., health status assessment; health promotion, disease prevention; environmental hazards; substance abuse; emergency medical services). Prerequisite: HSERV 511 or permission of instructor. Offered: jointly with HSERV 501.

EPI 503 Public Health Surveillance: Epidemiology and Health Policy (2/4) Covers data collection and analysis for public health and their use in formulation of policy and programs. Content is delivered through studies of various surveillance systems: injuries, AIDS, birth defects, vaccine-preventable diseases, occupa-

tional illnesses and injuries, adverse drug reactions, chronic diseases, hospital-acquired infections, disasters. Offered: jointly with HSERV 503.

EPI 511 Introduction to Epidemiology (3-4) For the graduate student wishing to devote only one quarter to a course in epidemiologic methods. Description of ways in which variation in disease occurrence is documented, and how that variation is studied to understand causes of disease. Prerequisite: graduate standing. Offered: A.

EPI 512 Epidemiologic Methods I (4) *Koepsell, Weiss* Principles and methods of epidemiology. Covers measures of disease frequency, measures of effect, causal inferences, descriptive epidemiology, study types, misclassification, and effect modification. Designed for students who want to take 513. Prerequisite: prior or concurrent enrollment in BIOST 511 or equivalent. Offered: A.

EPI 513 Epidemiologic Methods II (4) *Koepsell, Weiss* Continuation of 512. Considers how designs of epidemiologic studies may be constructed to maximize etiologic inferences. Covers confounding, randomized trials, cohort studies, case-control studies, and selected topics. Prerequisite: 512. Offered: W.

EPI 514 Application of Epidemiologic Methods (4) *Mueller, Schwartz* Practical experience in analysis of data. Students analyze data sets currently on file using contemporary epidemiologic methods as taught in 512 and 513. Prerequisites: 512, 513 and epidemiology major. Offered: Sp.

EPI 517 Methods and Applications of Genetic Epidemiology (3) *Austin* Research methods for evaluating genetic influences on disease, risk factors. Study designs, statistical methods include twin studies, family studies, population-based association studies, complex segregation analysis, allele-sharing methods, linkage analysis. Prerequisites: 512, 513; BIOST 511, 512, 513; background in human genetics or equivalent basic genetics course. Offered: jointly with ENV H 517; even years, W.

EPI 519 Epidemiology of Cardiovascular Disease (3) *Psaty* Principles, methods, and issues in the epidemiology of cardiovascular disease. Focuses on coronary heart disease and its major risk factors; also covers other topics such as stroke and sudden death. The format includes informal lectures and discussions of the current literature. Prerequisite: 511 or 512, 513. Offered: W.

EPI 520 Infectious Diseases Epidemiology (4) *Foy* Principles and practices of epidemiology, focusing on communicable diseases. Methods for epidemiological investigation of infections taught by reading classical descriptions of disease outbreaks and analyzing current papers. Term paper required, consisting of an investigation of an infectious disease outbreak or a protocol for a research study. Prerequisite: 511 or permission of instructor. Offered: A.

EPI 521 Epidemiology of Maternal and Child Health Problems (4) *Emanuel, Williams* Contributions of epidemiology to the understanding and prevention of major maternal and child health problems, including problems of pregnancy outcome, infant and child morbidity and mortality, maternal morbidity and mortality, and abnormal child growth and development. Prerequisites: graduate, medical, or dental school standing and 511 or 512 or permission of instructor. Offered: jointly with HSERV 542; W.

EPI 523 Injury Epidemiology (3) *Cummings* Overview of the field of injury epidemiology and injury prevention. Topics include the Haddon matrix, injury scoring systems, drowning, bicycle injuries, fires, poisoning motor vehicle crashes, firearm injuries, social and financial costs of injuries, and prevention strategies. Includes discussion on the use of computer databases to study injuries. Offered: odd years; W.

EPI 524 Epidemiologic Studies of Cancer Etiology and Prevention (3) *Farrow, Kristal* Current knowledge of the role that chemicals, radiation, viruses, familial factors, immunodeficiencies, and benign diseases play in the etiology of various cancers, as determined from studies in human populations; the epidemiologic characteristics of most major types of cancer; applications of epidemiologic principles to planning and evaluating programs of primary, secondary, and tertiary cancer prevention. Prerequisite: 511 or 513. Offered: Sp.

EPI 525 Topics in Preventive Medicine (2) *Foy, Henderson* Examine current scientific knowledge and state of the art of preventive medical interventions. Discuss and consider options for current practice. Prerequisite: MD, OD, NP or permission of instructor. Offered: jointly with HSERV 505.

EPI 526 Zoonotic Diseases (3) *DiGiacomo, Rausch* Explores the public health aspects of zoonotic diseases, their epidemiology and current approaches to control. Focuses on the major viral, rickettsial, bacterial, protozoal, helminthic, and fungal diseases transmitted from wild and domesticated animals to humans in North America. Prerequisite: 511, 512, or 520 or permission of instructor. Offered: jointly with C MED 526.

EPI 527 Practical Issues in the Conduct of Epidemiologic Studies (2) Seminar format focusing on practical aspects of conducting epidemiologic studies. Topics include selection of a research topic, data sources and collection tools, selection of study subjects, human subjects review, grant writing, and the peer review process. Credit/no credit only. Prerequisite: graduate standing or permission of instructor. Offered: odd years.

EPI 528 Exposure Measurement in Epidemiology (3) *White* Principles and methods of measuring exposures and covariates in epidemiological studies. Validity and reliability of measures, questionnaire design, effects of measurement error, maximizing response rates, quality-control procedures, measurement of specific exposures. Prerequisite: 513. Offered: Sp.

EPI 529 Emerging Infections of International Public Health Importance (3) *Kimball* Overview of current emerging infections worldwide and contributing factors. Design of a surveillance and prevention strategy required. Offered: jointly with HSERV 536. W.

EPI 530 AIDS: A Multidisciplinary Approach (2) *Kautsky, Kreiss* Comprehensive overview of the public health, clinical, and laboratory aspects of AIDS. Topics include the pathogenesis, natural history, and management of human immunodeficiency virus (HIV) infections. The impact of AIDS on community and global health care and prospects for prevention and control. Offered: jointly with MED 530.

EPI 531 Problems in International Health (4) *Gloyd* Survey of the relationship of the sociocultural, political, economic, and demographic characteristics of developing countries to disease occurrence and to the solution of health problems. Prerequisite: graduate or medical student standing. Offered: jointly with HSERV 531.

EPI 532 Epidemiology of Infectious Diseases of Third-World Importance (3) *Kreiss* A review of major infectious disease problems of the developing world, including AIDS, malaria, tuberculosis, measles, diarrhea. Means of assessing the impact of infectious diseases on the health of communities through surveillance and appropriate survey techniques. Offered: odd years.

EPI 533 Pharmacoeconomics (2) *Heckbert, Stergachis* Introduction to the study of risks and benefits of pharmaceuticals. Overview of drug development and approval, assessment of methods for study of drug risks and benefits, and their relationship with

the formulation of public policy. Prerequisite: graduate standing. Offered: jointly with PHARM 533.

EPI 535 Maternal and Child Health in Developing Countries (3) *Kimball* Familiarizes graduate students with issues in maternal and child health of less developed countries. Emphasizes health risks at each phase of life of women including risks in childhood and adulthood (the reproductive years). The role of politics, economics, culture, and technology examined. Prerequisite: graduate standing or permission of instructor. Offered: jointly with HSERV 535; Sp.

EPI 536 Categorical Data Analysis in Epidemiology (4) Summary of univariate categorical data analysis; introduction to multivariate analysis of categorical epidemiologic data using multiplicative models. Experience at interpretation; familiarity with available programs gained by analysis of bona fide data, critiques of analyses appearing in literature. Prerequisites: 514 and BIOST 513; or BIOST 515; or permission of instructor. Offered: jointly with BIOST 536.

EPI 537 Survival Data Analysis in Epidemiology (4) Introduction to the multivariate analysis of survival data using multiplicative models. Application to epidemiologic studies. Familiarity with interpretation and available computer programs gained by analysis of bona fide sets of data and critiques of analyses appearing in the literature. Prerequisite: 536 or permission of instructor. Offered: jointly with BIOST 537.

EPI 538 Nutritional Epidemiology (3) *Beresford, Kestin* Application of epidemiological methods to current studies of nutrition and disease. Special methodological problems of importance in nutritional epidemiological studies. Diet and heart disease, and diet and cancer relationships. Enables students to plan studies in nutritional epidemiology. Prerequisite: 511 or 512 or permission of instructor. Offered: jointly with NUTR 538.

EPI 539 Research Methods in Developing Countries (3/4) *Gale, Gloyd* Simple, practical methodologies to obtain and validate information regarding health status and health services in developing countries. Usefulness, validity, limitation of vital records, health reports, household (and cluster) surveys, nutritional anthropometry, and qualitative methods discussed. Lectures, computer lab, and student participation in community based survey. Offered: jointly with HSERV 539; A.

EPI 542 Clinical Epidemiology (2) *Weiss* Principles and methods involved in studying outcome of illness. Prerequisite: 511, or 512 and 513. Offered: S.

EPI 588 Molecular Epidemiology of Infectious Diseases (2) Application of molecular typing techniques to study of microbial pathogens to increase understanding of epidemiology of infectious diseases. Brief review of molecular biology. Evaluation of methods used in outbreaks and epidemics reported in literature. Prerequisites: 511 or 512 or permission of instructor. Offered: jointly with ENV H/PABIO 568.

EPI 570 Occupational and Environmental Epidemiology (3) *Checkoway* Research methods for studying occupational and environmental determinants of disease. Defining exposed populations, characterizing exposure levels, estimating disease risks relative to exposure. Cohort, case-control, cross-sectional designs for various health outcomes. Applications to exposure standard setting and risk assessment. Prerequisite: 511 or 512, 513 or permission of instructor. Offered: jointly with ENV H 570.

EPI 573 Methods and Issues in Using Biological Measurements in Epidemiologic Research (2) Introduction to use of measurement from biological specimens in epidemiologic studies. Prepares epidemiology and laboratory science students for conduct of interdisciplinary human studies. Evaluation of biomarkers, preliminary studies, methodologic issues, quality control. Brief review of molecular biology. Appli-

cations and current literature discussed. Prerequisites: 511 or 512. Offered: jointly with ENV H 573; W.

EPI 583 Epidemiology Seminar (1, max. 3) Presentation of current epidemiologic research and application of epidemiologic research in the practice of public health. Offered: AWSp.

EPI 589- Epidemiologic Research in Aging Populations (3) LaCroix Emphasizes application of epidemiologic methods to the study of older populations. Topics include: compression of morbidity; successful aging; methodological challenges in studying older populations; physical, cognitive and social function as epidemiological endpoints; chronic conditions of the aging (heart disease, cancer, Alzheimer's disease, dementia, osteoporosis, fractures); health promotion strategies. Prerequisites: 511 or 513. Offered: jointly with HSERV 589.

EPI 590 Selected Topics in Epidemiology or International Health (1-6) Tutorials are arranged for a small number of students for in-depth examination of an area of epidemiology or international health, usually of current nature. Seminar format. Prerequisite: 511. Also a special summer format presenting introductory material. May be taken with ENV H 590 and/or HSERV 590. For more information and permission, consult the department program adviser. Offered: AWSpS.

EPI 591 Current Literature in Epidemiology (1) Articles pertaining to epidemiology and related subjects selected from the current literature to be distributed and read by all participants. Faculty members and enrolled students alternate being responsible for conducting sessions and choosing articles to read. Prerequisites: 513. Offered: AWSp.

EPI 592 Program Seminars (1-6) Graduate seminars organized to address specific educational needs of students in various specialized programs within the Department of Epidemiology (i.e., Maternal and Child Health). Prerequisite: permission of instructor. Offered: AWSpS.

EPI 593 Cancer Prevention Research Laboratory (3) White Provides research experience on cancer prevention projects at the Fred Hutchinson Cancer Research Center. Offered: jointly with BIOS 593; AWSpS.

EPI 600 Independent Study or Research (*) Prerequisite: permission of departmental adviser. Credit/no credit only. Offered: AWSpS.

EPI 700 Master's Thesis (*) Prerequisite: permission of departmental adviser. Credit/no credit only. Offered: AWSpS.

EPI 800 Doctoral Dissertation (*) Prerequisite: permission of departmental adviser. Credit/no credit only. Offered: AWSpS.

Health Services

H664 Health Sciences

Undergraduate Program

Health Information Administration Postbaccalaureate Certificate Program

The program in Health Information Administration is designed to prepare individuals for a career in an administrative health care profession. Course work is enhanced by a field placement during one academic quarter. The program gives students the tools to become involved in a wide variety of health care arenas upon graduation, including health information management, health care quality improvement, research, health care financing, and consulting. Program re-

quirements can be completed in three quarters (nine months) on a full-time basis, or over a longer period of time on a part-time basis.

The program is accredited by the Commission on Accreditation of Allied Health Education Programs (CAAHEP), or its successor, in cooperation with the American Health Information Management Association's (AHIMA) Council on Accreditation.

Special Requirements

Applicants need a baccalaureate degree from an accredited college or university with a GPA of 2.50 or higher. They must also have taken courses in or have the requisite knowledge and skills pertaining to the following: human anatomy and physiology (laboratory course); pathophysiology; introduction to basic computer applications such as spreadsheets, databases, or word processing, or introductory programming; principles of management; statistics (any discipline); and medical terminology. Applicants who still need to complete any of these requirements may apply and submit a plan for completion of prerequisites.

Correspondence and Information

Director, Health Information Administration Program, Box 354800

Graduate Program

The Department of Health Services offers a two-year graduate program in health services leading to the Master of Public Health degree and maintains primary responsibility for the graduate program in Health Services Administration (an interdisciplinary degree-granting program of the Graduate School described in the Interdisciplinary Graduate Degree Programs section of this catalog). The department also offers a three-year extended degree program in community health management leading to the M.P.H. degree for employed professionals working full-time and, in addition, participates in the training of doctoral students from other departments on campus by offering a specialization in health services under the Doctoral Studies Program.

Master of Public Health

The M.P.H. program in health services gives priority to individuals who have completed their professional health training such as physicians, dentists, and nurses. Others who have had substantial experience in the health field are also considered. This program offers a general curriculum that includes introduction to health systems, epidemiology, current issues regarding the provision of medical care, and methodological training for research and program evaluation. Examples of areas of concentration include studies of patient and provider behaviors; evaluation of local, state, and federal health programs; and the impact of technology on medical care costs and benefits. There are three special tracks: one in maternal and child health and one in international health, both offered jointly with the Department of Epidemiology, and one in social and behavioral sciences.

The *Maternal and Child Health* track presents an interdisciplinary approach to the wide variety of factors that influence the health and health care of women and children. It combines practical and classroom experience to give students: in-depth understanding of the behavioral, biological, social, and environmental factors that influence health and illness in maternal and child populations; competency in public health research and analytic methods; skills in program management; supervised experience in applying science and management tools to the planning, development and evaluation of health programs and policy.

The academic track in *International Health* is available to students enrolled in the M.P.H. program and the Ph.D. program in epidemiology. The program focuses on community health and primary health-care systems

of the developing world. Students learn the basic principles of public health and identify the social, political, and economic determinants of illness. They also learn about the planning, management, and evaluation of health-care systems. Requirements include the completion of core M.P.H. courses, a series of international health courses, and a thesis project on a topic relating to third-world health. Students are encouraged to carry out their thesis projects in an international setting. Previous developing country health-related experience is helpful for admission.

The *Social and Behavioral Sciences* academic track is available to students enrolled in an M.P.H. degree program in the School of Public Health and Community Medicine. The program focus is on research and application of knowledge concerning the relationships among (1) social, cultural, and behavioral processes; (2) health and illness; and (3) what society does and can do to promote health and prevent illness. Students receive training in the general theories and methods of the social and behavioral sciences applied to public health interventions for well persons and people with disabilities. Students may choose to plan a course of study concentrating in a particular area of inquiry. Those areas supported within the department are (1) health promotion and disease prevention, (2) chronic illness and disability, and (3) community intervention and research.

If deemed appropriate by their advisers, students may take courses in other departments of the University. Community agencies and resources are used extensively. Students with a background in medicine may qualify to receive concurrent credit for residency training in preventive medicine.

Admission Requirements

In addition to completing Graduate School admission requirements, applicants to the M.P.H. program must submit at least three letters of recommendation, Graduate Record Examination scores, and a goal statement. At least three years of medical or health-care experience are required. In general, applicants are accepted only for summer and autumn quarters of each year. The application deadline is February 1.

Doctoral Studies Program

Doctoral study in health services is available to qualified students on campus who are enrolled in the doctoral programs of other departments (e.g., anthropology, biostatistics, economics, epidemiology, geography, medicine, nursing, operations research, organizational theory, political science, psychology, social work, sociology, etc.). Students in the Doctoral Studies Program take four courses in health services and focus their dissertation on original research that relates the basic discipline to a specific health services issue (e.g., health behavior, health-care organizations, costs, quality and utilization of health-care services, etc.).

Financial Aid

Every attempt is made to ensure that students admitted are not prevented from pursuing graduate studies due to inadequate finances. A limited number of fellowships, assistantships, scholarships, and loans are available each year. However, students admitted should be prepared to utilize their own resources to finance their graduate education.

Research Facilities

In addition to utilizing University facilities, the program makes use of community health-care delivery systems and agencies for research and training.

Correspondence and Information

M.P.H. and M.H.A. Degree Programs: Graduate Program Coordinator, Box 357660.

Doctoral Studies Program: Committee Director, Box 357660.

International Health Program: Student Services Coordinator, Box 357660, or 543-6714.

Maternal and Child Health Program: Administrator, Box 357230, or 543-0312.

Social and Behavioral Sciences Program: Box 357660, or 616-2979.

Extended M.P.H.

The Extended M.P.H. degree program is a three-year, part-time program delivered through a combination of intensive four-week summer sessions on the University campus, directed independent study, and intensive weekend (Friday-Saturday) seminars during the academic year. Designed for mid-career public and community health professionals with three or more years of experience in the health-care field, the program provides knowledge and skills required at mid- and upper-level practice and management positions for health professionals. In addition to the core courses in epidemiology, biostatistics, and environmental health, the prescribed course work includes a broad exposure to the health-care system plus specific management training in accounting, finance, personnel management, economics, organization theory, and program planning and evaluation. Pathways are also available in maternal and child health and in health education.

Admission Requirements

In addition to Graduate School admission requirements, applicants must submit a program application, at least three letters of recommendation, Graduate Record Examination scores, and a goal statement. A minimum of three years' work experience in the health-care field is required. Applicants are accepted to begin in the program summer quarter. Deadline for priority consideration is December 1. Applications will be accepted through March 1 and considered on a space-available basis. Because the program is self-sustaining, the tuition rate differs from the usual on-campus programs.

Correspondence and Information

Extended M.P.H. Degree Program, Box 357660.

Faculty

Chair

William L. Dowling

Professors

Bergman, Abraham 1964, (Adjunct); MD, 1958, Case Western Reserve University; ambulatory pediatrics.

Buchner, David M. * 1984; MD, 1977, University of Kansas; MPH, 1984, University of Washington; geriatric health promotion.

Chapko, Michael K. * 1978, (Research); PhD, 1972, City University of New York; diffusion of health technologies, cost-effectiveness in health care.

Connell, Frederick A. * 1978; MD, 1972, New York University; MPH, 1978, University of Washington; maternal and child care, health services.

Conrad, Douglas A. * 1977; MHA, 1973, University of Washington; MBA, 1977, PhD, 1978, University of Chicago.

Curry, Susan J. * 1985; MA, 1979, PhD, 1981, University of New Hampshire; health behavior change.

Day, Robert W. * 1968; MD, 1956, University of Chicago; PhD, 1962, University of California (Berkeley); health-information systems.

Deyo, Richard A. * 1986; MD, 1975, Pennsylvania State University; health status measurement and evaluation of common medical practices.

Diehr, Paula K. * 1970; MS, 1967, PhD, 1970, University of California (Los Angeles); health services; application of statistics to small area analysis.

Dowling, William L. * 1977; MBA, 1961, University of Chicago; MA, 1970, PhD, 1971, University of Michigan.

Gale, James L. * 1969, (Adjunct); MD, 1961, Columbia University; MS, 1969, University of Washington; epidemiology and control of infectious disease, international health, public health practice.

Gilson, Betty S. * 1969, (Emeritus); MD, 1943, University of Minnesota; health-status measurement.

Henderson, Maureen M. * 1975, (Adjunct); MBBS, 1949, DPH, 1956, University of Durham (UK); epidemiology of chronic diseases.

Klastorin, Theodore * 1974, (Adjunct); PhD, 1973, University of Texas (Austin); operations management, facility location, project management, waiting lines, logistics, inventory.

Koepsell, Thomas D. * 1979; MD, 1972, Harvard University; MPH, 1979, University of Washington; chronic diseases, applying epidemiologic concepts to medical practice.

Larson, Eric B. * 1977, (Adjunct); MD, 1973, Harvard University; internal medicine.

Madden, Carolyn Watta * 1975; MA, 1974, PhD, 1976, Johns Hopkins University; health economics and policy.

Mayer, Jonathan D. * 1977, (Adjunct); PhD, 1977, University of Michigan; medical geography, clinical applications, philosophy.

Milgrom, Peter M. * 1974, (Adjunct); DDS, 1972, University of California (San Francisco); management of fearful and phobic dental patients, quality of dental care.

Monsen, Elaine R. * 1969; MS, 1959, PhD, 1961, University of California (Berkeley); nutrition, dietetics.

Muecke, Marjorie A. * 1979, (Adjunct); PhD, 1976, University of Washington; medical anthropology, women's health, refugee health, Southeast Asia.

Novack, Alvin H. 1979, (Adjunct); MD, 1958, Temple University; general pediatrics.

Patrick, Donald L. * 1987; MS, 1968, PhD, 1972, Columbia University; aging, disablement, and health-related quality of life.

Perrin, Edward * 1975; MA, 1956, Columbia University; PhD, 1961, Stanford University; health information services, research methodology.

Ross, Austin Jr. 1977; MPH, 1955, University of California (Berkeley); ambulatory care, health care delivery systems.

Wagner, Edward H. * 1984; MD, 1965, State University of New York (Buffalo); MPH, 1972, University of North Carolina; clinical epidemiology and health services research, health promotion and disease prevention.

Wing, Kenneth * 1990; JD, 1971, MPH, 1972, Harvard University; law, politics and policy; financing health care.

Associate Professors

Beicher, Donald W. * 1976, (Adjunct); MD, 1962, University of Pennsylvania; ambulatory medicine.

Bell, Michelle * 1985; MSW, 1967, PhD, 1984, University of Washington; maternal and child health, and adolescent health.

Cheadle, Allen D. 1987, (Research); PhD, 1987, University of California (Berkeley); community based program, evaluation methods, health economics (organization and finance).

Christensen, Dale B. * 1976, (Adjunct); PhD, 1977, University of Minnesota; pharmacy administration.

Ellsworth, Allan J. 1981, (Adjunct); PharmD, 1977, Philadelphia College of Pharmacy & Science; primary care, family medicine.

Fihn, Stephan * 1979, (Adjunct); MD, 1977, St Louis University; MPH, 1981, University of Washington; internal medicine.

Gloyd, Stephen S. * 1986; MD, 1973, University of Chicago; MPH, 1983, Harvard University; political economy, epidemiology, and primary health care in developing countries.

Goldberg, Harold I. 1986, (Adjunct); MD, 1977, Stanford University; internal medicine.

Grembowski, David * 1981; MA, 1975, Washington State University; PhD, 1982, University of Washington; dental care demand, fluoridation, dental health services research.

Grossman, David C. 1988, (Adjunct); MD, 1982, University of California (Los Angeles); MPH, 1990, University of Washington; general pediatrics.

Hedrick, Susan * 1983; MA, 1975, PhD, 1982, Michigan State University; long term care, health services.

Hoover, J. Joanne * 1972, (Adjunct Research); MD, 1960, University of Illinois; MPH, 1972, University of Washington; cardiovascular epidemiology, public health practice.

Kienast, Philip K. * 1970, (Adjunct); PhD, 1972, Michigan State University; human resources management.

Kimball, Ann M. 1993; MD, 1976, MPH, 1981, University of Washington; maternal and child health, HIV/AIDS, international health.

Kristal, Alan R. * 1987, (Adjunct); DPH, 1983, Columbia University; nutritional epidemiology, dietary behavior, nutrition intervention, and cancer control.

Kukull, Walter A. * 1985, (Adjunct); PhD, 1984, University of Washington; Alzheimer's disease; epidemiologic methods; chronic disease epidemiology.

LaCroix, Andrea Z. * 1989, (Adjunct); PhD, 1984, University of North Carolina; epidemiology of aging.

Martin, Diane P. * 1973; MA, 1972, Temple University; PhD, 1979, University of Washington; health services use and cost, alternative delivery systems and insurance.

McCann, Barbara S. 1986, (Adjunct); MS, 1982, PhD, 1984, Rutgers University; psychology.

Pearlman, Robert A. * 1981, (Adjunct); MD, 1975, Boston University; gerontology.

Psaty, Bruce M. * 1984, (Adjunct); PhD, 1979, MD, 1981, Indiana University; cardiovascular disease, coronary heart disease, hypertension, and pharmacoepidemiology.

Rhodes, Lorna A. * 1983, (Adjunct); PhD, 1973, Cornell University; medical anthropology, symbolic anthropology, South Asia, religion, psychiatry.

Richardson, Mary L. * 1978; MHA, 1978, PhD, 1984, University of Washington; organization, management, and analysis of policy relevant to health services.

Spigner, Clarence 1994; MPH, 1982, DPH, 1987, University of California (Berkeley); cultural diversity and health services for disadvantaged populations.

Thompson, Engelberta 1989; MA, 1978, PhD, 1981, Western Michigan University; smoking cessation.

Urban, Nicole D. * 1988; MS, 1973, DSc, 1978, Harvard University; analysis of the cost-effectiveness of disease prevention trials and interventions.

Watts, D. Heather 1985, (Adjunct); MD, 1981, Jefferson Medical College; perinatal medicine.

Wickizer, Thomas M. * 1988; MSW, 1974, University of Washington; MPH, 1979, MA, 1987, PhD, 1989, University of Michigan; health promotion evaluation.

Wood, Robert W. 1979, (Adjunct); MD, 1970, University of Rochester; internal medicine.

Assistant Professors

Goldbaum, Gary M. * 1989, (Adjunct); MD, 1978, University of Colorado (Denver); MPH, 1989, University of Washington; the epidemiology of human behaviors that increase risk for disease.

Holt, Victoria L. * 1991; MPH, 1987, PhD, 1990, University of Washington; reproductive health epidemiology, impact of prenatal care and perinatal technology.

Kinne, Susan 1994, (Research); MA, 1979, PhD, 1986, University of Washington; disability statistics/prevention, measurement of community needs, worksite health promotion.

Lessler, Daniel 1990; MD, 1986, Stanford University; MHA, 1992, University of Washington; physician management and decision-making, pharmacoeconomics.

Levine, Phyllis 1995, (Research); MEd, 1982, PhD, 1993, University of Washington; special education; health care and quality of life for diverse disability populations in rural areas.

Meischke, Hendrika W. * 1991; MPH, 1987, PhD, 1992, University of Michigan; health communication, with an emphasis on mass media and health.

Montano, Daniel E. * 1979, (Affiliate); PhD, 1983, University of Washington; attitude-behavior research and behavior change, cancer control, HIV prevention.

Reiber, Gayle * 1991; MPH, 1975, Johns Hopkins University; PhD, 1989, University of Washington; epidemiology and health services research on preventing complications of diabetes.

Sullivan, Sean * 1992; PhD, 1992, University of California (Berkeley); pharmacoeconomics.

Weaver, Marcia R. 1987, (Research); MA, 1981, PhD, 1986, University of Chicago; international/occupational health, managed care, willingness to pay contingent valuation methods.

Senior Lecturers

Collins, Robert N. 1991; MS, 1967, EdD, 1970, University of Oregon; health education.

Gish, Oscar * 1989; MSS, 1967, The Hague (Netherlands); MPH, 1969, University of Sussex (UK); socioeconomic dimensions of health and health services; third world development focus.

Hanken, Mary A. 1991; MEd, 1974, Seattle University; PhD, 1989, University of Washington; health information systems.

Katz, Aaron 1993; CPH, 1975, University of Toronto (Canada); health policy analysis.

Lecturers

Downer, Ann E. 1989; MS, 1984, University of Washington; EdD, 1996, Seattle University; education and training, educational program design and development, health communication.

Gonzales, Virginia 1994; MSW, 1971, MPH, 1974, University of California (Berkeley); EdD, 1988, Harvard University.

Karck, Joan Marie * 1974; MS, 1969, Case Western Reserve University; applied nutrition including food intake methods and clinical dietetic practice.

Murphy, Gretchen C. 1992; MEd, 1973, University of Washington; health information administration.

Shiu-Thornton, Sharyne 1988; MA, 1980, University of Washington.

Thompson, John R. 1989; MSW, 1976, University of Washington.

Waters, Kathleen A. 1992; MEd, 1973, Seattle University; health information administration.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

HSERV 475 Perspectives in Medical Anthropology (5) Rhodes Introduction to medical anthropology. Explores the relationship among culture, society, and medicine. Examples from Western medicine as well as from other medical systems, incorporating both interpretive and critical approaches. Offered: jointly with ANTH 475.

HSERV 499 Independent Study in Health Services (1-12) Individual library or field study project. Selected in consultation with a faculty adviser. Prerequisite: permission of instructor(s).

Courses for Graduates Only

Public Health/Preventive Medicine

HSERV 501 Public Health Practice at the Local Level (3) History and development of local and state public health departments. Traditional vs. new roles and critical interactions with public, private agencies highlighted. Examples drawn from areas of current concern (e.g., health status assessment; health promotion, disease prevention; environmental hazards; substance abuse; emergency medical services). Prerequisite: 511 or permission of instructor. Offered: jointly with EPI 501.

HSERV 502 AIDS, Public Health, and the Humanities: A New Perspective (3) Downer Initiates discussion on AIDS related topics such as primary prevention, social and epidemiological trends, public health controversies, harm reduction, and international efforts. Participants study and discuss the humanities: history, philosophy, ethics, music, the fine arts, poetry and literature. Seminar with guest lecturers. Credit/no credit only. Offered: W.

HSERV 503 Public Health Surveillance: Epidemiology and Health Policy (2/4) Covers data collection and analysis for public health and their use in formulation of policy and programs. Content is delivered through studies of various surveillance systems: injuries, AIDS, birth defects, vaccine-preventable diseases, occupational illnesses and injuries, adverse drug reactions, chronic diseases, hospital-acquired infections, disasters. Offered: jointly with EPI 503; A.

HSERV 504 Mass Media and Health (3) Overview of theory and publication on ways the mass media affect health behavior at the individual and societal level. Topics covered include theoretical perspectives on health behavior, mass communication, persuasion, and practical steps involved in design, implementation and analysis of successful media interventions. Prerequisite: registration in Extended Degree Program. Offered: S.

HSERV 505 Topics in Preventive Medicine (2) Foy, Henderson Examine current scientific knowledge and state of the art of preventive medical interventions. Discuss and consider options for current practice. Prerequisite: MD, OD, NP or permission of instructor. Offered: jointly with EPI 525; S.

Introductory Core Courses

HSERV 510 Society and Health (3) Spigner Analysis of social inequalities in health and service use by class, gender, and race. Examines biological, cultural, social, political, and economic determinants which consistently put minority groups within Eurocentric societies at higher risk for inequitable health status and provision. Prerequisites: 511 or equivalent or permission of instructor. Offered: W.

HSERV 511 Introduction to Health Care and Public Health Services (3-4) Dowling History, organization, and effectiveness of United States health care

and public health systems. Determinants of health, need, and utilization. Public and private financing. Supply and provision of personal and public health services. Managed care. Government and private sector roles. Economic, organizational, political, and value perspectives applied to examine access, cost, and effectiveness. Prerequisite: graduate standing or permission of instructor. Offered: A.

HSERV 512 Introduction to Management in Health Services (3) Sappington Overview of managerial roles, such as supervising and motivating, approaches to organizational and environmental assessment and change, and development of systems analysis skills. For students pursuing careers in research and teaching who will likely have management responsibilities. Offered: Sp.

HSERV 513 Allocating Health Care Resources: A Population Based Perspective (4) Conrad Analysis of health services financing in the United States, with comparison to systems of other developed countries. Develops analytic and normative frameworks for examining public and private health insurance. Study of pricing, underwriting, benefit design, and delivery system; financing integration issues. Prerequisite: 511 or equivalent or permission of instructor. Offered: W.

HSERV 516 Introduction to Health Services—Extended Degree (4) Definition of health and its determinants, including the role of health services. Contrasting aspects of personal health services and public health. Blending of traditional public health and personal health and medical care. Prevention in health care with consideration of screening, sensitivity, and specificity. Prerequisite: registration in Extended M.P.H. Degree program. Offered: A.

HSERV 517 Provision of Health Services—Extended Degree (2) Consideration of factors that influence the utilization of health services, including socioeconomic and cultural. Health belief systems and health behavior, with specific consideration of the effects of these factors on utilization of services and prevention. Prerequisites: 516, registration in Extended M.P.H. Degree program. Offered: W.

HSERV 518 Social and Ethical Issues in Health Services (2) Rationale for evaluation of health services; quality control and its relation to costs. Patient protection and participation in determining medical care. Regulation of new drugs and devices. Criteria for the use of new technology. Ethical considerations, including informed consent. Prerequisite: registration in Extended M.P.H. program or permission of instructor. Offered: Sp.

Methods Courses

HSERV 520- Methods in Applied Community Research (2-) Skills/knowledge necessary to conduct orderly investigation of specific problems in preparation for M.P.H. thesis or project. Includes problem identification, posing research questions, literature review, consideration of theoretical/practical context, choosing a study design, data collection, protection of human subjects, and recognizing potential errors. Prerequisite: registration in Extended M.P.H. Degree program. Offered: A.

HSERV 521 Health Services Research Methods (3) Diehr, Reiber Selected topics for students who have already taken introductory courses on research methods and data analysis. Variety of study design, measurement, analysis issues that pose special methodological challenges in health services research. Provides overview of given topics, illustrations of how local investigators address them. Prerequisites: 511, BIOST 511, and EPI 511 or 512 or permission of instructor.

HSERV 522- Health Program Evaluation (3-) Grembowski Politics, theory, and methods of evaluation, from simple feedback mechanisms to evaluation of large-scale ongoing programs and social experiments. Emphasis on applications of experimental and quasi-experimental designs to estimate program im-

facts, as well as evaluation of program implementation. Case studies drawn from health field illustrate various types of evaluation. Prerequisite: background in quantitative methods. Offered: A.

HSERV 523 Community Health Assessment (3) *Connell* Survey of approaches and tools to measure health status and health-care problems in defined communities. Topics include: uses and limitations of available data; community surveys; public health surveillance; problem identification and needs assessment; measurement of community health indices; analytic methods; and presentation techniques for program and policy planning. Offered: Sp.

HSERV 524 Quality of Health Care: Assessment and Assurance (3) *Perrin* Examination of methods available for assessing the structure, processes, and outcomes of health services, with special emphasis on measure of health status. Discussion of methods for assuring continuous improvement in the quality of health care, with examples from a variety of current institutional and non-institutional settings. Prerequisites: 511, BIOST 511, or equivalent, or permission of instructor. Offered: Sp.

International Health

HSERV 531 Problems in International Health (4) *Gloyd* Explores social, political, economic, environmental determinants of developing countries' health; traces development of societal responses to problems. Includes: origins of primary health care; child survival; traditional systems; population; water; sanitation; international agencies; effects of economic policies. Case study formulating pharmaceutical policy in a developing country. Offered: jointly with EPI 531; S.

HSERV 533 Population, Health, and Development (2) *Povey* Provides students with an introduction to demographic conditions in Third World countries and an understanding of the consequences of rapid population growth on health and the environment. The context and effectiveness of family planning programs is a major focus. Offered: W.

HSERV 534 Comparative International Health Systems (3) *Belcher* Eight countries, including Britain, Canada, South Africa, China, and Ghana, reviewed by guest lecturers on quality, access, cost. Assesses the effects of local culture, politics, and resource constraints. Integrated framework (health policy and organization, health status and utilization, financing). Interprets information/alternatives. Required paper on one country's health care system. Prerequisite: graduate standing or permission of instructor. Offered: Sp.

HSERV 535 Maternal and Child Health in Developing Countries (3) *Kimball* Familiarizes graduate students with issues in maternal and child health of less developed countries. Emphasizes health risks at each phase of life of women including risks in childhood and adulthood (the reproductive years). The role of politics, economics, culture, and technology examined. Prerequisite: graduate standing or permission of instructor. Offered: jointly with EPI 535; Sp.

HSERV 536 Emerging Infections of International Public Health Importance (3) *Kimball* Overview of current emerging infections worldwide and contributing factors. Design of a surveillance and prevention strategy required. Offered: jointly with EPI 529. W.

HSERV 539 Research Methods in Developing Countries (3/4) *Gale, Gloyd* Simple, practical methodologies to obtain and validate information regarding health status and health services in developing countries. Usefulness, validity, limitation of vital records, health reports, household (and cluster) surveys, nutritional anthropometry, and qualitative methods discussed. Lectures, computer lab, and student participation in community based survey. Offered: jointly with EPI 539; A.

Health Care Organization and Provision

HSERV 541- Topics in Maternal and Child Health I (3-) *Bell* Historic, legislative, organizational, and financial basis of health and social services for families and children in the United States. Examines effects of changing family structure and norms; factors affecting the health care needs of specific populations, including racially and ethnically diverse groups; and the impact of policies/programs on the health and well-being of families and children.

HSERV 542 Epidemiology of Maternal and Child Health Problems (4) *Emanuel, Williams* Contributions of epidemiology to the understanding and prevention of major maternal and child health problems, including problems of pregnancy outcome, infant and child morbidity and mortality, maternal morbidity and mortality, and abnormal child growth and development. Prerequisites: graduate, medical, or dental school standing and 511 or 512 or permission of instructor. Offered: jointly with EPI 521; W.

HSERV 543 Topics in Maternal and Child Health III (3) *Connell* Examines the major child and adolescent health problems in the United States. The epidemiologic and programmatic aspects of each problem are discussed in the light of their implications for health policy. Prerequisite: graduate standing or permission of instructor. Offered: Sp.

HSERV 544 Integrated Health Care Delivery Systems (4) *Richardson, Ross* Focuses on the development of integrative health care delivery systems. While hospital and ambulatory care provide a focal point for the course, the objective is to examine system linkages with other providers, including public health, group practices, and community based health care delivery programs. Prerequisite: 511 or permission of instructor. Offered: A.

HSERV 545 Capstone Integrative Seminar (4) *Ross, Scott* Designed to assist students in the transition from theory to practice. Emphasis on sharpening analytical and intuitive practices through the use of interactive case studies and team building exercises. Prerequisite: second year MHA students. Offered: Sp.

HSERV 546 Long-Term Care (3) *Hawley* Learning experience for graduate students in health services administration, planning, other graduate students to increase their ability to identify and solve problems related to long-term care they confront in their employment. Students are exposed to available knowledge in the field; effective problem-solving attitudes and techniques for organizing information and/or developing strategies, and agencies in the field. Prerequisite: 511 or permission of instructor. Offered: Sp.

Health Policy and Politics

HSERV 551 Health Law (3) *Wing* Analysis of law, the legal system and current legal problems as they relate to the financing and delivery of health care services. Offered: Sp.

HSERV 553 Politics of Health Care (3) *Hagens* Understanding of health policy formation within the context of American political system. Health policy is examined in terms of historical analysis, political cultural federalism, legislative process, bureaucracy, initiative process, information in the political process, and interest groups. Students interact with major participants in health policy arena. Prerequisite: 511 or permission of instructor. Offered: A.

HSERV 554 Health Legislation Seminar (1) *Hagens, Katz, Thompson* Discussion of current state health policy topics with legislative staff and others involved with state health policy. In addition to two sessions on campus, course meets once during the quarter in Olympia. Offered: W.

HSERV 555 Health Policy (3) *Sloma* Provides an opportunity to gain and apply tools of policy analysis. Alternative techniques of gathering, synthesizing, and

analyzing available information in a timely fashion. Attention focused on written and oral presentation to a policy audience on a "real" health issue. Offered: Sp.

Health Services Management

HSERV 560 Managing Health Care (3) *Richardson* Introduction to leadership and organizational behavior and structure, focusing on effective leadership and human resource management. Organizational structure and strategy introduced. Case studies and other problem solving methods, using health services applications utilized in order to apply theoretical material. Prerequisite: graduate student.

HSERV 561 Health Planning: The Management of Change (4) *Erbstoesser* Designing realistic implementation strategies at beginning of planning process to optimize impact of planning on real problems. Discussion of ways in which change is brought about and decisions are made and implemented. Includes managing planning process, work plans, stakeholders, negotiation, and working with groups. Prerequisite: 511 or permission of instructor. Offered: A.

HSERV 562 Health Services Management (4) *Dowling* Management of goals, strategy, and structure in health care organizations. Design of external relationships, strategy-formulation, decision-making, and change. Integration of professional, social, and organizational values. Theory, student and practitioner experience, and care used. Prerequisite: 511 or 560 or permission of instructor. Offered: W.

HSERV 563 Personnel Management for Health Professionals (3) Designed for midcareer health services professionals developing strategies and skills in human resource management. Focuses on policy and practice issues important to handling day-to-day personnel problems-selection, promotion, performance appraisal, discipline, grievances. Prerequisite: registration in Extended M.P.H. Degree program or permission of instructor; non-business majors. Offered: Sp.

HSERV 564 Techniques For Strategic Planning and Marketing in Health Services (4) *Blackman, Haines* Review of the essential elements of a market-based strategic planning process. Application of these elements through case study, in-class discussion, and panel discussions with area experts. Emphasis upon strategic thinking for inpatient/outpatient services management. Prerequisite: 511 or permission of instructor. Offered: Sp.

HSERV 565 Quantitative Decision Making for Health Services Management (3) *Pilcher* Applications of various quantitative techniques for problem solving, monitoring, controlling, decision making in health services. Identifying problem area, communications with consultant, evaluation to the quality and applicability of analyst's work. Statistical, mathematical, operations research, industrial engineering techniques. Prerequisite: QMETH 500 or BIOST 511 or permission of instructor. Offered: W.

HSERV 566 Decision Support Models for Health Services (3) Management science and approaches developed as applied to problems in public health. Conceptual understanding of processes and application of systematic, rational approach to managerial problem solving, including cost-benefit, cost effectiveness analysis. Prerequisites: BIOST 472 and 473, or BIOST 511; registration in Extended M.P.H. Degree program; non-business majors. Offered: S.

HSERV 569 Information Systems (3) *Altamore* Assessing information system needs; planning, managing, and evaluating information systems (IS); behavioral issues in the implementation of IS. Current and evolving applications of IS in health care organizations and public health. Prerequisite: basic computer literacy required. Offered: W.

Health Care Financing and Financial Management

HSERV 571 Hospital Financial Management (3) *Huabner, Tiscornia* Third course in a three-course sequence dealing with the management of health services institutions and programs. Topics covered are: health services law, hospital and program policy decisions, financial planning, and hospital design and architecture; and the presentation of hospital survey and health services research project reports. Prerequisites: 511 and ACCTG 500 or 501 or permission of instructor. Offered: Sp.

HSERV 572 Financial Management for Health Professionals (3) Intensive review of basic accounting principles and terminology, introduction to financial management and managerial accounting, including budgeting for managerial control, planning, cost accounting, financing health programs. Managerial accounting. Prerequisites: BIOST 472 and 473, or BIOST 511; registration in Extended M.P.H. Degree program or permission of instructor; non-business majors. Offered: S.

HSERV 573 Seminar in Health-Care Finance (3) *Conrad* Practical applications of corporate finance principles in health-care field. Applies theoretical framework to health-care financial problems of varying complexity, including capital investment analysis, leasing vs. borrow-to-buy decision, debt capacity analysis, bond refunding, control of capital, joint venture. Prerequisite: 585 or equivalent, ACCTG 500, 501; or permission of instructor. Offered: A.

Social and Behavioral Sciences

HSERV 581- Health Behavior and Preventive Medicine: Theoretical Perspectives (3-4-) *Meischke* Focuses on theoretical perspectives related to health behavior and health promotion activities. Theoretical perspectives discussed at the individual, interpersonal, and community levels. Emphasis on application and integration of these theoretical perspectives. Offered: Sp.

HSERV 582 Strategies of Health Promotion (3) *Curry* Major types of health promotion strategies in use; attention to strengths, weaknesses, and potential utility of alternative strategies. Programs employing social engineering (e.g., legal regulation, social marketing), behavioral modification, education examined in terms of efficacy, cost effectiveness in modifying health-hazardous lifestyles, environmental exposures. Prerequisite: 511.

HSERV 583 Society, Chronic Illness, and Disability (3) *Hedrick* Multidisciplinary perspectives of chronic disease and disability throughout the life course, including illness behavior and the sick role; aging and disablement; behavior change; methodological approaches in research; disability policy. Prerequisite: 510 or permission of instructor. Offered: offered jointly with SOC 561; Sp.

HSERV 584 Medical Technology Assessment (3) *Sullivan* Discussion of economic evaluation techniques for the assessment of medical technologies. Focus on cost-effectiveness and cost-utility analyses, decision analysis, and economic model building for the purpose of resource allocation decisions. Entry code required. Prerequisite: permission of instructor. Offered: jointly with PHARM 534; A.

HSERV 585 Health Economics (3) *Wickizer* Uses economic concepts and tools to examine range of issues pertaining to health care, delivery of health care services. Includes demand analysis, production of health services, expenditure growth, markets for hospital and physician services, externalities. Emphasis on using economics to examine issues and solve problems. Prior economics courses not required. Offered: W.

HSERV 586 Medical Geography (3) *Mayer* Geography of disease, consideration to health systems planning. Distributions, diffusion models, migration studies. Application of distance, optimal location models to health systems planning; emergency medical services, distribution of health professionals; cultural variations in health behavior. Prerequisites: familiarity with social science research, health-related issues. Offered: jointly with GEOG 580.

HSERV 587 Health Policy Economics (3) *Madden* Applies economic theory to selected topics in health care, including malpractice, risk and insurance, industry organization, government regulation, and public health issues. Emphasizes policy implications of these applications. For students who have taken microeconomic theory or 585. Prerequisite: 585 or PB AF 516 or equivalent, or permission of instructor. Offered: W.

HSERV 588 Community Approaches to Health Promotion (3) *Thompson* Provides opportunities to critically examine community-based health promotion interventions and the design, evaluation, and implementation issues they raise. A wide range of disciplinary perspectives is presented. Case studies and class projects are designed to give students the skills needed to critically assess community projects around health promotion. Offered: W.

HSERV 589- Epidemiologic Research in Aging Populations (3) *LaCroix* Emphasizes application of epidemiologic methods to the study of older populations. Topics include: compression of morbidity; successful aging; methodological challenges in studying older populations; physical, cognitive and social function as epidemiological endpoints; chronic conditions of the aging (heart disease, cancer, Alzheimer's disease, dementia, osteoporosis, fractures); health promotion strategies. Prerequisites: EPI 511 or EPI 513. Offered: jointly with EPI 589.

HSERV 590- Selected Topics in Health Services (*) By individual arrangement, the student and faculty member(s) develop a program of reading and conference appropriate to the topic selected by the student. The topic chosen will be within the special competence of the faculty participating in the course, in the areas of health-care delivery and health-care administration. Also special summer format presenting introductory material may be taken with ENV H 590 and/or EPI 590. For more information and permission, consult department program adviser.

HSERV 591 Tutorials and Special Seminars (1-4) Special topics related to current issues in health services. Topics determined by expressed interest of students and faculty; also includes participation of health professionals. Prerequisites: 511 or 513.

HSERV 592 Program Seminars (1-6) Graduate seminars organized to address specific educational needs of students in various fellowships, residencies, and other specialized programs within the Department of Health Sciences (i.e., maternal and child health, international health, preventive medicine, social and behavioral sciences). Prerequisite: permission of instructor.

HSERV 595 Practicum/Field Work in Community Medicine (1-12) Experience in variable time blocks in community health activities in agencies delivering and planning health services. Sites include neighborhood clinics, health planning bodies, medical practice settings, public health agencies, special problem clinics and facilities, environmental programs and services. Prerequisite: masters student in health services and permission of instructor.

HSERV 596- MHA Field Project (1-6-) Supervised research in a selected topic related to student's concentration in graduate study. Includes survey of literature, development of approach, and written paper on conclusions. Prerequisite: successful completion of

first-year curriculum and internship in graduate program in health services administration and planning.

HSERV 597 International Health Projects (1-12) Field-based projects during which students learn how social, economic, and political conditions in a developing country affect the health status of populations while being involved in the design, implementation, and analysis of community health surveys. Prerequisite: permission of instructor.

HSERV 598 Extended Degree Program Project Option (*, max. 9) Supervised project work on a selected topic related to student's concentration in graduate study. Includes survey of literature, development of approach, and written paper on conclusions. Prerequisites: registration in extended MPH degree program and satisfactory completion of the first summer's course work.

HSERV 600 Independent Study or Research (*) Prerequisite: permission of instructor.

HSERV 700 Master's Thesis (*) Prerequisite: permission of instructor.

Pathobiology

F143 Health Sciences

Graduate Program

C. C. Kuo, Graduate Program Coordinator

The Department of Pathobiology offers a research training program leading to the degrees of Master of Science and Doctor of Philosophy. As a discipline, pathobiology stands at an interface between fundamental biology and clinical medicine. The mission of the department is to apply the latest research technologies to the study of human disease and disease agents. Members of the department have diverse research interests including the molecular biology of cancer; molecular investigation of pathogenesis; drug resistance and host responses; diagnosis of diseases; development of vaccines and therapeutics; and fundamental biology of infectious agents. Course work provides the foundation for interfacing molecular and cellular biology with public health issues.

Admission Requirements

Students with a variety of academic backgrounds are accepted for graduate school in pathobiology. It is highly desirable that applicants have completed course work in biology, organic chemistry, and biochemistry and/or molecular and cellular biology. Persons holding professional doctorates (medicine, dentistry, veterinary medicine) are also encouraged to enter the graduate program.

Financial Aid

Some financial aid may be available in the form of research assistantships funded primarily through federal research grants held by faculty members.

Research Facilities

In addition to the research facilities at the University of Washington, opportunities for training also exist at the Fred Hutchinson Cancer Research Center, the Biomembrane Institute, and the Seattle Biomedical Research Institute.

Correspondence and Information

Graduate Program Coordinator
Department of Pathobiology, Box 357238

Faculty

Chair

Patricia W. Wahl

Professors

Carter, William G. * 1981; PhD, 1974, University of California (Davis); elucidation of components in cell attachment and cell spreading in normal cells.

Grayston, J. Thomas * 1960, (Adjunct); MD, 1948, University of Chicago; epidemiology and control of infectious disease.

Hakomori, Sen-Itiroh * 1967; MD, 1951, DMedSc, 1956, Tohoku Imperial University (Japan); role of glycosphingolipids in defining antigenicity, cellular interaction.

Kenny, George E. * 1961; PhD, 1961, University of Minnesota; human immune response to infectious diseases, detection and biology of mycoplasmas.

Klebanoff, Seymour * 1962, (Adjunct); MD, 1951, University of Toronto (Canada); PhD, 1954, University of London (UK); infectious disease.

Kuo, Cho-Chou * 1969; MD, 1960, National University Taiwan; PhD, 1970, University of Washington; antigenic analysis, immunology and pathogenesis of chlamydiae.

Perine, Peter L. * 1981, (Adjunct); MD, 1966, University of Kansas; MPH, 1973, University of Washington; international health, sexually transmitted diseases.

Rausch, Robert L. * 1978, (Emeritus); DVM, 1945, Ohio State University; PhD, 1949, University of Wisconsin; parasitology, helminthic zoonoses.

Roberts, Marilyn C. * 1981; PhD, 1978, University of Washington; mycobacterium, antibiotic resistance genes, plasmids and sexually transmitted diseases.

Stuart, Kenneth Daniel * 1985; PhD, 1969, University of Iowa; molecular biology of parasites.

Todaro, George J. * 1983; MD, 1963, New York University; growth regulation in normal/tumor cells, growth factors and their receptors, novel cell therapies.

Wahl, Patricia W. * 1971; PhD, 1971, University of Washington; multivariate statistical techniques, especially regression analysis applied to cardiovascular data.

Wang, San-Pin * 1961, (Emeritus); MD, 1944, DMedSc, 1959, Keio University; classification, pathogenesis, and epidemiology of chlamydiae.

Associate Professors

Campbell, Lee Ann * 1985; PhD, 1982, Pennsylvania State University; molecular biology and pathogenic mechanisms of chlamydiae.

Kahn, Michael * 1992, (Research); PhD, 1983, Yale University; molecular recognition, protein structure-function relationships, peptidomimetics.

Parsons, Marilyn * 1981; PhD, 1979, Stanford University; signal transduction and organelle biogenesis in African trypanosomes.

Reed, Stephen G. * 1993; PhD, 1979, University of Montana; immune response to human pathogens.

Riley, Donald E. * 1982, (Research); PhD, 1976, University of Washington; pathogenic research and diagnosis involving DNA sequences.

Rosenfeld, Michael E. * 1992; PhD, 1981, University of Wisconsin; mechanisms of atherogenesis and macrophage gene expression.

Thouless, Margaret E. * 1980; PhD, 1974, University of Birmingham (UK); retroviruses, herpes viruses, enteric viruses, immunodiagnosis, virus variability.

Van Voorhis, Wesley C. * 1986, (Adjunct); PhD, 1983, Rockefeller University; MD, 1984, Cornell University; infectious diseases.

Wayner, Elizabeth A. * 1995; PhD, 1980, La Trobe University, Australia; molecular immunology.

Yamamoto, Fumichiro * 1988, (Research); PhD, 1983, Osaka City University (Japan); molecular biology of histo-blood group ABO genes.

Assistant Professors

Bartelmez, Stephen Hollis * 1988; PhD, 1979, University of Glasgow (UK); eukaryotic transcription regulation, with emphasis on cellular and viral transcription factors.

Bosch, Marnix L. * 1994; MS, 1984, University of Utrecht (Netherlands); PhD, 1987, University of Leiden (Netherlands); molecular virology of lentiviruses and herpes viruses, as well as animal models for viral diseases.

Cangelosi, Gerard A. * 1985; PhD, 1983, University of California (Davis); molecular biology of tuberculosis.

Feagin, Jean E. * 1993; PhD, 1982, Stanford University; molecular parasitology, emphasizing organelle gene organization and expression in protozoans.

Howard, Randall F. * 1993; PhD, 1978, University of Minnesota; molecular and cellular biology of malaria parasites, host immune responses.

Lampe, Paul D. * 1995, (Research); PhD, 1984, University of Michigan; gap junction assembly, mechanism and regulation.

Myler, Peter J. * 1993; PhD, 1982, University of Queensland (Australia); regulation of gene expression in protozoan parasites.

Rose, Timothy M. * 1991; PhD, 1981, University of Geneva (Switzerland); molecular biology of tumor viruses, cell growth, differentiation, and transformation.

White, Theodore C. * 1996; PhD, 1984, University of Michigan; fungal pathogenesis and drug resistance, with emphasis on infections in immune compromised patients.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

PABIO 201 Newly Emerging Diseases in Public Health (2) NW Kenny, Perine Newly recognized and emerging disease pose a major problem for public health. AIDS, hantavirus infections, Ebola virus infections, and the role of bacterial infection in the causation of stomach ulcers are examples of problems to be studied. Other timely diseases are presented in this lecture discussion course. Offered: Sp.

UCONJ 420 Biological Safety Practices (1) Kenny See University Conjoint courses.

PABIO 445 Medical Virology (2) NW Thouless, Wong An introductory course emphasizing basic understanding of medical virology and viral pathogenesis. The biochemical, replication, host-parasite relationships and pathogenesis of animal viruses are examined. Prerequisite: basic biology. Recommended: 441 or permission of instructor. Offered: jointly with MICROM 445; Sp.

PABIO 498 Undergraduate Thesis (*)

PABIO 499 Undergraduate Research (*)

Courses for Graduates Only

PABIO 511 Pathobiological Frontiers (2) Kenny Molecular and immunological concepts of infectious and noninfectious diseases presented in format suitable for graduate students knowledgeable in health-

related areas who are not in biology-oriented programs. Allergy, immune responses, nature of infectious agents, prevention of disease with emphasis on newly defined diseases and disease agents. Prerequisite: permission of instructor.

PABIO 521 Tissue Culture and Virology (3) Kenny, Thouless General concepts, techniques, and applications of tissue culture with emphasis on use of tissue culture for viral diagnosis and propagation. Nutrition, growth characteristics, and metabolism of animal cell cultures. Laboratory experiments give practical experience in tissue culture and virology. Prerequisite: permission of instructor.

PABIO 522 Antigenic Analysis of Microorganisms (3) Kenny Theory and techniques for antigenic analysis of complex mixtures, including microorganisms. Recent advances in separating antigens, identifying antigenic determinants, and antigenic mapping of proteins. Laboratory includes a special problem of the student's choice. Prerequisite: permission of instructor.

PABIO 525 Cell Surface Membrane in Cell Sociology and Immunology (2) Carter, Hakomori Structure and function of cell surface membranes in relation to various immunobiological and pathobiological phenomena (differentiation, organization, infection, cancer) covered. Prerequisites: BIOC 440, 441, 442, MICROM 447, and permission of instructor. Offered: jointly with MICROM 525.

PABIO 531 Applications of Molecular Biology to Public Health (2) Campbell Addresses the impact of molecular biology on public health. Lectures focus on the application of biotechnology to diagnostics, pharmaceuticals, vaccines, and environmental concerns. Considerations for developing and using biotechnology products also discussed. Prerequisites: courses in genetics, biochemistry, or microbiology, or permission of instructor.

PABIO 536 Bioinformation and Gene Sequence Analysis (3) Rose Discussion of nature and relevance of biological sequence information, current techniques for determining protein and DNA sequences, computer-based analysis, archival and retrieval of sequence information, available biological and biochemical databases, and methods for database accession and interrogation. Credit/no credit only. Prerequisite: biochemistry, molecular biology, and permission of instructor. Offered: W.

PABIO 540 Antibiotic Resistance Mechanisms and Their Impact on Public Health (3) Roberts Lectures covering resistance mechanisms against bacterial antibiotics, antiviral, antiparasitic, and cancer drugs. Topics also include the effects that resistant microorganisms have on therapy and cancer treatment and their impact on public health. Prerequisite: permission of instructor.

PABIO 548 Molecular and Cellular Parasitology (3) Feagin Molecular and cellular biology of parasites of health-related significance, emphasizing current research topics unique to parasites, particularly well-suited for study in parasites, and especially important to study in host-parasite systems. Prerequisite: familiarity with molecular and cellular biology and permission of instructor. Offered: odd years; W.

PABIO 550 Diseases of Public Health Importance and Strategies for their Control (3) Public Health perspective of major disease of national and global importance. Discussion of origins, establishment, progression, and pathogenesis of diseases. Importance of immunological, intercellular and external factors, and strategies of disease prevention. Requires a grounding in cellular and molecular biology, microbiology, and immunology. Prerequisite: permission of instructor.

PABIO 551 The Application of Basic Research to Diseases of Public Health Importance (3) Diseases of major national and international public health significance.

cance. Discussion of epidemiological aspects and clinical approaches. Analysis of relevant biological systems and their application to the pathobiology of disease. Requires familiarity with molecular and cellular biology. Prerequisite: permission of instructor.

PABIO 568 Molecular Epidemiology of Infectious Diseases (2) Application of molecular typing techniques to study of microbial pathogens to increase understanding of epidemiology of infectious diseases. Brief review of molecular biology. Evaluation of methods used in outbreaks and epidemics reported in literature. Prerequisites: 511 or 512 or permission of instructor. Offered: jointly with ENV H/EPI 568; W.

PABIO 580 Pathobiology Seminar (1, max. 15) Research from students, faculty members, and invited speakers is presented and discussed. Topics include immunochemistry, viruses, membranes, infectious diseases, immune response and other related topics.

PABIO 581 Current Literature in Pathobiology (1, max. 15) Critical evaluation of recent articles related to human disease and disease agents. Prerequisite: graduate student in pathobiology or permission of instructor.

PABIO 583 Seminars on Frontier Membrane Research (1, max. 15) *Hakomori* Structure and functional roles of cell surface membrane molecules in cell recognition and transmembrane signaling with emphasis on pathological significance in development of various disease processes. Discussion on experimental design based on current knowledge among researchers in the Department of Pathobiology and at the Biomembrane Institute. Advanced sequel to 525.

PABIO 590 Selected Topics (1-6) In-depth study of an issue relating to pathobiology. Seminar format. Small groups of students by arrangement with faculty member. Credit/no credit only. Prerequisites: enrollment in pathobiology graduate degree program and permission of instructor.

PABIO 598 Didactic Pathobiology (*, max. 12) Supervised teaching experience in pathobiology courses for Ph.D. candidates. Prerequisite: permission of instructor.

PABIO 600 Independent Study or Research (*) Prerequisite: permission of graduate program adviser. Credit/no credit only.

PABIO 700 Master's Thesis (*) Prerequisite: permission of graduate program adviser. Credit/no credit only.

PABIO 800 Doctoral Dissertation (*) Prerequisite: permission of graduate program adviser. Credit/no credit only.



Reserve Officer Training Corps Programs

Aerospace Studies

204 Clark

The Air Force Reserve Officer Training Corps program (AFROTC) is designed to motivate, educate, and commission highly qualified students for active duty as officers in the U.S. Air Force. The curriculum provides the opportunity for students in any major to gain military knowledge and to become an effective Air Force officer and leader in the aerospace environment.

General Program Requirements

The freshman- and sophomore-level general military courses are open to all students attending any two- or four-year college or university full time. Any student may enroll in these one credit courses.

Commissioning Requirements

Students who successfully complete the AFROTC program and receive an academic degree from the University are offered commissions as second lieutenants in the Air Force.

General Military Courses

The basic division courses consist of one classroom hour and one leadership laboratory hour per week during the freshman and sophomore years. Uniforms and textbooks are provided. Students may enter the freshman class at the start of autumn, winter, or spring quarters. Sophomore students may enter at the start of autumn or winter quarters and take the freshman- and sophomore-level courses concurrently. A four-week field training course, taken during the summer between the sophomore and junior years, is required for entry into the professional officer courses. Students receive pay and travel costs for field training.

Except for sophomore cadets on AFROTC scholarship, students incur no active duty service commitment by taking general military courses, and students may drop the courses at any time.

Professional Officer Courses

Cadets selected for enrollment in professional officer courses are enlisted in the Air Force Reserve and receive tax-free monthly subsistence pay of \$150. They are furnished texts and uniforms. Junior- and senior-level classes consist of three hours of academic classes and one hour of leadership laboratory per week.

Financial Assistance

The Air Force offers one-, two-, and three-year scholarships to college students. The following is a partial list of fields where most scholarships are granted: engineering, science and technology, nursing, medicine, computer science and engineering, meteorology, physics, and mathematics.

AFROTC scholarships pay tuition, certain fees, and full textbook reimbursement. In addition, scholarship winners receive a \$150 subsistence allowance per month. To take advantage of these scholarships, students

should apply directly to the Department of Aerospace Studies (AFROTC), 543-2360.

Two-Year Program

To provide for those students unable to take the general military courses, a two-year professional officer course is available on a competitive basis. This program is open to graduate students and full-time undergraduate students who will complete a bachelor's degree in two years.

Students in this program are required to attend a six-week field training course at an Air Force base during the summer preceding program entry. The student is paid during the six-week period. Upon return to the campus, students enter the professional officer course. Uniform, texts, and \$150 monthly subsistence are provided.

Two-year scholarships are available for qualified students in any major. Students interested in this program should contact the AFROTC department by May 1 prior to the autumn quarter they desire to enter.

Correspondence and Information

Professor of Aerospace Studies
204 Clark, Box 353830
(206) 543-2360
email: uro@u.washington.edu

Faculty

Chair

Jack L. Johnson

Professor

Johnson, Jack L. 1996; MS, 1979, Golden State University; public administration.

Assistant Professors

Linder, Dale S. 1994; MS, 1987, University of Southern California; systems management.

McCann, Lisa E. 1996; MA, 1995, University of Dayton; international affairs.

Plumb, Terence A. 1995; MS, 1994, College of Great Falls; counseling psychology.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

A S 101, 102, 103 Aerospace Studies 100 (1,1,1)
Focuses on the basic characteristics of air doctrine; US Air Force mission and organization; functions of United States strategic offensive and defensive, general-purpose, and aerospace support forces; officership/professionalism and an introduction to communicative skills. Additional one-hour leadership laboratory is mandatory. Offered: A, W, Sp.

A S 211, 212, 213 Aerospace Studies 200 (1,1,1)
Factors contributing to the development of air power from its beginnings to the present, and the evolution of air power concepts and doctrine. History of air power employment in military and nonmilitary operations in support of national objectives. Assessment of communicative skills. Additional one-hour leadership laboratory is mandatory. Offered: A, W, Sp.

A S 331, 332, 333 Aerospace Studies 300 (3,3,3)
Emphasis on leadership and management fundamentals, professional knowledge, leadership ethics, and communicative skills are required of an Air Force junior officer. Case studies used to examine leadership and management situations. Mandatory leadership laboratory

provides advanced leadership experiences in officer-type activities, giving students the opportunity to apply learned principles. Offered: A, W, Sp.

A S 431, 432, 433 Aerospace Studies 400 (3,3,3)
Needs for national security, evolution of American defense strategy and policy, methods for managing conflict; alliances and regional security to preserve American interests. Arms control and terrorism. The military as a profession, officership, the military justice system, current military issues; refinement of communicative skills. A one-hour leadership laboratory is also required. Offered: A, W, Sp.

Military Science

104 Clark

The ROTC program provides the student an opportunity to learn and practice the art of leading people. Recognizing that there is a great difference in cognition and volition, the program is structured in such a way as to give the student actual practical experience in leading and managing resources.

The Army ROTC program enables the student to learn about the military profession and the role it plays in our democratic system of government. The courses enable such knowledge to be acquired on the campus without having to serve in the military forces.

The Army ROTC electives enrich the student's course of study. Taking these courses also opens up an additional career option to the student, enabling him or her to gain a commission and to serve in the Army as an officer; or in the Reserves or National Guard while pursuing another chosen career.

Army ROTC provides the student membership in a close-knit fraternal organization.

ROTC programs on college campuses are the nation's way of ensuring that all the influences of higher education are transported into the military services—a mandatory requirement in a democracy.

Traditional Four-Year Program

Open to freshman and sophomore men and women. Academic studies include courses in military history and tactics, principles of leadership, techniques of instruction, management and staff procedures, logistics, physical conditioning, and military law. Extracurricular activities include such options as Ranger Company, air pistol and rifle teams, color guard, training exercises, field trips, and related activities. A student incurs no obligation of any kind during the first two years of the four-year AROTC program. Basic course grades are not included in the GPA.

Placement credit toward completion of AROTC courses may be given for prior ROTC or military training. Veterans routinely receive full credit for the first two years of AROTC and may enter the advanced course when they are academic juniors. All military textbooks and uniform items are furnished without charge. Students in the advanced course receive tax-free monthly subsistence of \$150 for a maximum of twenty months. In the advanced course, cadets are required to participate in the leadership development program, which is a practicum of skills and principles taught during the previous two years. Between their junior and senior years, cadets attend a six-week summer camp during which they receive varied and challenging training and for which they are paid both for the time at camp and for travel expenses to and from the camp location. Upon entering the advanced course, students agree to complete the course, to accept a commission upon graduation, if offered, and to serve on active duty for four years after commissioning or three to six months' active duty training, with the balance of service in the Army Reserve or National Guard.

Two-Year Program

This program is open to qualified undergraduate and graduate students with at least two years in school remaining and who have completed 81 credits. Students may qualify for entrance into the advanced course under this program in either one of two ways.

First, they may participate as qualified veterans who receive placement credit for the first two years of AROTC. Veterans are also eligible to compete for two- and three-year scholarships while receiving their educational benefits. Members of the Reserves and National Guard may also be eligible to participate in AROTC and receive their commission upon graduation.

The second alternative under this program requires attendance at Basic Camp for six weeks at Fort Knox, KY. Completion of this basic camp also qualifies students for direct entry into the advanced course. While at camp, students receive pay plus travel expenses to and from the camp location, and they can compete for two-year scholarships.

Two- and Three-Year Scholarship Program

This program is open to qualified students on campus. The scholarship provides financial assistance during the remaining years of the student's enrollment. Each scholarship pays for tuition and a flat rate for books and laboratory expenses and provides subsistence of \$150 per month, tax free. All other advantages and obligations are the same as those of the four-year scholarship program.

Four-Year Scholarship Program

Application for this program should be made while the student is still in high school. Selection of students is made on a nationwide competitive basis. This program may lead to a commission in the Regular Army or the Army Reserve. All tuition, a flat rate for books and laboratory expenses, and uniform items, plus tax-free subsistence of \$150 for a maximum of four years, are provided by the Army. The program requires four years of academic study on campus, as well as a six-week advanced camp training period between the junior and senior years, for which the cadet is paid for both time and travel expense to and from the camp location. Academic studies are identical to those of the traditional four-year program. The student must sign a contract (with the consent of parents if under eighteen years of age) wherein he or she agrees to complete the program, to enlist in the Reserve, to accept a commission if offered, and to serve on active duty for four years after commissioning.

Correspondence and Information

Professor of Military Science
104 Clark, Box 353820
(206) 543-9010; FAX (206) 543-9070
email: roo@milsci.washington.edu

Faculty

Chair

Daniel Brewer Hink

Professor

Hink, Daniel Brewer 1992; MA, 1992, Central Michigan University; criminology, general administration.

Assistant Professors

Eisenhauer, Scott A. 1995; BS, 1985, US Military Academy; civil engineering, personnel management.

Harville, Russell R. 1995; BS, 1990, US Military Academy; aerospace engineering.

Morris, Dean C. 1993; MS, 1989, Florida Institute of Technology; acquisition and contract management.

O'Neil, Gaynelle L. 1993; BS, 1981, Oregon College of Education (Monmouth); English, writing, anthropology.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

MSCI 101, 102, 103 Military Science I: Basic (2,2,2)

History, organization, and mission of the United States Army and the Reserve Officer Training Corps. Relationship to the citizen's military and civilian obligations. Functions and organization of the United States defense establishment. Fundamentals of leadership and management. Leadership laboratories and two field training exercises conducted during the year encompass training in field craft, survival, and small unit tactics. Offered: AWSp, AWSp, AWSp.

M SCI 201, 202, 203 Military Science II: Basic (2,2,2)

Develops proficiency in oral and written communications. Presents a perspective on the world wide military threat; an evaluation of tactical methodologies of the hostile nations to include conventional weapon systems employment. Control, prevention, and treatment of combat or emergency medical situations. Fundamentals of military map reading, aerial photography, compass and field navigation, are taught and applied. Leadership laboratories and two field training exercises during the year. Offered: AWSp, AWSp, AWSp.

M SCI 301, 302, 303 Military Science III: Advanced (3,3,3)

Small-unit tactics, emphasizing the importance of firepower, movement, and communications. Duties, responsibilities, and methods of employment of basic military units. Leader's role in directing and coordinating individuals and military units from squad to company level. Students are introduced to the planning and conduct of individual and group physical conditioning activities, stressing positive motivation to establish high standards of morale and esprit. Principles and techniques of command, control, military management, and leadership are taught and practiced throughout the academic year. Leadership laboratories and two field training exercises during the year. Prerequisites: completion of basic training; basic camp or 9 credits of 100- and 200-level courses. Offered: AWSp, AWSp, AWSp.

M SCI 305 Practicum—Techniques of Military Instructions (1-3)

Analysis, review of techniques used in military training and instructions. Students plan, rehearse, deliver, provide written critique on block of military instruction from the Military Qualification Skills Manual. Prerequisites: admission to ROTC advanced course, permission of instructor, completion of 9 credits of 300- or 400-level courses.

M SCI 401, 402, 403 Military Science IV: Advanced (2,3,2)

The Army officer's position in contemporary world and impact on problems within the military service. Use of a developmental study to provide awareness of personal responsibilities and official relationships of an Army officer. Organization and functions of command and staff positions. Coordination of administration, logistics, and planning for military operations. Basic concepts of legislative and executive authority for the Uniform Code of Military Justice (to include a study of the officer's authority and responsibility within the military justice system). Problem-solving techniques used by small-unit leaders, emphasizing coordination and planning by the junior officer. Leadership laboratories and two field training exercises during the year. Prerequisites: completion of basic training; basic camp or 9 credits of 100- and 200-level courses. Offered: AWSp, AWSp, AWSp.

Naval Science

305 Clark

The Department of Naval Science offers University students an opportunity to engage in study that leads to a commission in the U.S. Navy or Marine Corps while working toward a baccalaureate degree. The Naval Reserve Officer Training Corps (NROTC) unit functions in conjunction with the Department of Naval Science. An NROTC student may select an academic major within certain limitations (i.e., some majors that normally lead to immediate graduate education, such as prelaw or premedicine, are not consistent with the mission of the NROTC program).

In addition to their University curricula, NROTC students attend naval science courses in history and customs, naval engineering/weapons systems, navigation, naval operations, and leadership/management. In addition, each student must attend one drill session and one naval science laboratory session per week. During the summer, students may have a four-to-six-week training cruise to put into practice earlier classroom training.

Any University student may take any naval science course without enrolling in the NROTC Program. Two programs are offered.

Navy-Marine Scholarship Program

Each year, men and women are accepted for scholarship status in the four-year, three-year alternate, and two-year NROTC scholarship programs. Eligibility for the three- and four-year programs is based upon nationwide competition and selection by a central selection committee. Application must be made by December 1 of the academic year preceding appointment as midshipman. Those selected are provided educational benefits, including subsidy by the Navy of all tuition, fees, textbooks, and uniforms, plus \$150 per month in subsistence pay.

For the two-year scholarship program, applications from current sophomores, or juniors enrolled in five-year programs of study, must be received by March. Those chosen by a central selection committee attend a six-week course of instruction at the Naval Science Institute (NSI) at Newport, Rhode Island, during the summer prior to their junior year. Successful completion of NSI instruction qualifies these students for enrollment in the advanced courses in the NROTC program. All scholarship students are appointed as midshipmen, USNR, and upon graduation are commissioned as officers in the Navy or Marine Corps Reserve, after which they serve on active duty for a minimum of four years.

Navy-Marine College Program

Each year, men and women are accepted for four- and two-year nonscholarship college programs. Applications for the two-year program are accepted from current sophomores in community colleges or four-year colleges and must be received prior to March of their sophomore year (or third year, if in a five-year program).

Those students selected for the two-year program attend a six-week course of instruction at NSI during the summer prior to their junior year. Successful completion of NSI instruction qualifies students for enrollment in the advanced course in the NROTC program. Students in the NROTC college program pay their own college expenses but receive monthly subsistence pay of \$150 during their junior and senior years. The Navy furnishes all uniforms and textbooks used in naval science courses.

All college program students are eligible for a scholarship after completing one academic term, with scholarship awards based on academic grades and participa-

tion within the midshipman battalion. The two-year college program students also may win a scholarship for superior performance at NSI. Upon graduation, college program students are commissioned in the Navy Reserve or Marine Corps Reserve and serve on active duty for three years.

Correspondence and Information

Professor of Naval Science
305 Clark, Box 353840
(206) 543-0170

Faculty

Chair

James W. Orvis

Professor

Orvis, James W. 1994; BS, 1963, Missouri Valley College; MS, 1973, US Naval Postgraduate School; naval propulsion, strategic studies.

Associate Professor

Walls, Keith A. 1995; BSEE, 1975, Oregon State University.

Assistant Professors

Loschinkohl, Victor J. 1995; BA, 1988, Central Michigan University.

Madura, Michael J. 1994; BS, 1988, University of Florida; industrial engineering.

Ryman, Frank R. 1994; BA, 1983, University of Washington.

Course Descriptions

See page 56 for explanation of course numbers, symbols, and abbreviations.

Courses for Undergraduates

NSCI 111 The Naval Service (3) General introduction to the Navy, its organization, missions, roles, tasks, and operating methods. The relationship to the other services within the Department of Defense is emphasized. Offered: A.

NSCI 112, 113 Sea Power Practicum I, II (2,2) A comprehensive study of the role of sea power in the history of the United States, the current status of the various elements of the nation's sea power as they influence the development and implementation of national security policy, and the economic effects of the elements of sea power (the Navy, the merchant marine, port facilities, fisheries, and oceanographic capabilities). Offered: W, Sp.

NSCI 211 Naval Weapon Systems (3) Concept of naval weapons systems and the systems approach, the techniques of linear analysis of ballistics and weapons, the dynamics of basic components of weapons control systems. The tools are provided for understanding the basic principles that are involved in all modern naval weapon systems, gas turbines, and auxiliary power systems. Offered: A.

NSCI 212, 213 Naval Ship Systems I, II (3,3) Study of the varied ship systems operational in the Navy today, including the principles of characteristic propulsion systems and auxiliary machinery and the elements of ship stability and damage control. An introduction to nuclear propulsion, gas turbines, and auxiliary power systems. Offered: W, Sp.

NSCI 311 Navigation (3) The science and practice of maritime coastal navigation, including visual fixing, dead reckoning, and piloting methods. Computation of tides and currents and nautical rules of the road. Offered: A.

N SCI 312 Celestial Navigation (3) Theory and practice of celestial navigation. The student performs the complete "day's work" of the ship's navigator. Offered: W.

N SCI 313 Naval Operations (3) Introduction to naval operations, the employment of naval forces, naval tactics, formulation of operations plans and orders, employment of detection equipment, and meteorology. Offered: Sp.

N SCI 411 Psychology of Leadership (3) Introduction of the theory and techniques of naval leadership based on those principles of behavioral science that are pertinent to understanding individual and group behavior of adults. It introduces the student to the management process and the relationship of management functions to leadership. Acceptance of a traditional deep sense of moral responsibility on the part of the aspiring leader is stressed. Offered: A.

N SCI 412, 413 Naval Organization and Management I, II (3,3) Study of organization, systems, and techniques employed in the Navy for management of its human, financial, and material resources. Some of the work relates to the administration of discipline in the Navy under the Uniform Code of Military Justice. Emphasis is placed on the leadership and management role of the junior officer in the fleet. Offered: W, Sp.

Marine Corps Option Courses

N SCI 321, 322, 323 Evolution of Warfare I, II, III (3,3,3) Introduction to the art of war, the evolution of warfare from the earliest recorded battles to the present day. Offered: A, W.

N SCI 421, 422 Amphibious Warfare I, II (3,3) Provide basic knowledge of evolution of amphibious warfare from premodern era to present. Strategic and tactical considerations in planning specific operations and amphibious landings. Offered: A, W.

N SCI 423 USMC Leadership and Administration of Justice (3) Concepts, objectives, characteristic qualities, and practical techniques of leadership as exercised by the Marine Corps officer are studied. Emphasis is placed on the leadership and management role of the junior officer in the Fleet Marine Forces. Offered: Sp.



School of Social Work

Dean

Nancy R. Hooyman
210 Social Work/Speech and Hearing Sciences

The School of Social Work offers two professional programs, one at the undergraduate level and one at the graduate level, as well as a Ph.D. program. The undergraduate program prepares students for entry level generalist practice; students earn the Bachelor of Arts in Social Welfare degree. The graduate professional program prepares students for advanced practice within a field of concentration; students earn a Master of Social Work degree. Both professional programs are accredited by the Council on Social Work Education. The School also offers a Doctor of Philosophy degree in Social Welfare that prepares students for careers in research and education. For the three programs, no credit is granted on the basis of life experience or previous employment. All three programs are housed in the Social Work/Speech and Hearing Sciences Building, 4101 Fifteenth Avenue Northeast, Seattle, WA 98105-6299.

In addition, the School offers a concurrent degree program with the School of Public Health and Community Medicine leading to the M.S.W. and M.P.H. degrees.

Undergraduate Program

Margaret L. Spearmon, Director

Bachelor of Arts in Social Welfare

The undergraduate program leads to a Bachelor of Arts in Social Welfare degree. The program consists primarily of upper-division courses in social welfare, with additional requirements in human biology, economics, psychology, and sociology. Students enter the major at the start of their junior year after completing most of the liberal arts requirements established by the College of Arts and Sciences. Social welfare courses during a student's junior and senior years impart a basic knowledge of the social welfare system, including policy and working with culturally diverse and oppressed populations; of human behavior and the social environment; of the social work profession; of social welfare research; and of the skills necessary to prepare for entry level generalist social work practice.

The requirements and curriculum of the social welfare program may be summarized as follows:

Junior year—ECON 100, 200 or 201 (5); PSYCH 306 (5); SOC 352 (5); SOC WF 419 (3), 300 (3), 320 (3), 390 (3), 310, 311, 312 (3, 3, 3), and 404 (3).

Senior year—SOC WF 415 (12), 405 (6); social work electives (15).

Admission

Approximately 50 new juniors are admitted to the social welfare major each academic year for autumn quarter only. A selective admission procedure is used to determine entrance into the program. Applicants seeking admission should be admitted or admissible to the University; be eligible, or nearly eligible, for junior class standing (i.e., 65 completed credits of undergraduate work) by the beginning of the entry quarter; have completed a human biology course; be in good academic standing (i.e., 2.00 minimum GPA); submit a completed application to the program; and provide copies of their college transcripts.

Application forms and a more detailed description of the social welfare major are available at the School's admissions office from January 1 to May 1 for entrance into the program starting the following autumn quarter. The School's admissions office is located in 23C Social Work/Speech and Hearing Sciences. Admission application forms also can be mailed upon request, telephone (206) 543-5676. A student who wishes to discuss the program in person may arrange an interview by telephoning the Director of Admissions or by email at sswadm@u.washington.edu. Such inquiries are welcome.

Students accepted to the major at the end of their sophomore year surrender their premajor status by transferring their files and change-of-college forms to the School's Student Services Office, SWS 23F. Afterwards, they are advised by the Director of Student Services, located in the Student Services Office, SWS 23E. Students not accepted to the program may contact the Director of Admissions, SWS 23A, to discuss alternatives to the social welfare major, or the appeal process.

Graduate Program

Master of Social Work

The School of Social Work offers a Master of Social Work degree with three options for completion: a two year full-time program; a one year Advanced Standing program for qualified students with a degree in social work/social welfare from an accredited undergraduate program; and a three year Evening Degree program.

The program prepares students for advanced professional practice. The curriculum encompasses two distinct but interconnected areas: the beginning content or professional foundation and opportunities for advanced content in specialized practice.

The professional foundation provides instruction in the basic knowledge and skills required for effective, accountable social work practice as well as socialization to the profession, its value orientation, ethics, and history.

The advanced curriculum provides in-depth knowledge and skills needed for advanced practice in one major area of the social work profession. These include four concentrations in health and mental health; children, youth and families; multi-ethnic practice; and social welfare administration.

Admission Qualifications

Admission to the M.S.W. program requires formal admission to the Graduate School as well as to the School of Social Work. Applicants are required to have a bachelor's degree, a strong academic background, and social service experience. Applicants must submit transcripts, references, applications, Graduate Record Examination scores, and an admission essay to be considered for autumn quarter entry. February 15 is the closing date for receipt of applications and materials. Admission is competitive and selection is based on a review of the applicant's submitted materials.

Financial Aid

A limited number of financial aid opportunities are available to students. Applicants to the M.S.W. program are urged to apply for assistance through the Office of Student Financial Aid by February 15. Completion of the Free Application for Federal Student Aid (FAFSA) is requisite for consideration for any departmental funding. Departmental funding is limited to a few resident tuition scholarships which cover only one or two quarters of tuition. Inquiries may be directed to the Chair of the Scholarship Committee, School of Social Work.

Correspondence and Information

Admissions Office
School of Social Work, Box 354900
Seattle, WA 98105-6299

Master of Social Work— Master of Public Health Concurrent Degree Program

The School of Social Work participates with the School of Public Health and Community Medicine in a concurrent degree program leading to the M.P.H. and M.S.W. degrees. The program offers interdisciplinary preparation in the fields of public health and social work. Historically, public health and social work have shared an interest in a preventive approach to health and social problems, a community perspective, and a focus on vulnerable population groups. Both fields recognize the interrelationship of the health, social, and behavioral components of contemporary problems and the need for interventions and research that address all three components. The concurrent degree program prepares professionals who will function at the interface of both fields—in practice, research, planning, administration, and policy development.

Additional information concerning the concurrent degree program may be obtained from the Associate Dean for Academic Programs, School of Social Work, 685-1660.

Ph.D. Program in Social Welfare

Paula S. Nurius, Director and Graduate Program Coordinator

John F. Longres, Alternate Program Coordinator

The Ph.D. Program in Social Welfare prepares students to contribute to the advancement of knowledge and practice in the field of social welfare and the profession of social work. The program builds on the premise that social welfare scholarship must be scientifically based, responsive to service and practice needs, and informed of developments in related fields and disciplines.

After the first year of required courses, each student's program of study is individually designed and focuses on well-defined substantive and interventive areas of research in the field of social welfare. In the basic core of required courses, which include teaching and research practice, students have an opportunity to pursue their particular interests with faculty members in the School of Social Work and in other schools and departments.

During the first two years, students are expected to define and develop the specialized areas that will be the focus of their General Examination and subsequent dissertation research. The selected areas must have clear significance for the development of practice, programs, or policies in social work and social welfare. Various specialized areas of study are possible within the program, including, but not limited to, child welfare, aging, mental health, services to women, racial-ethnic minorities, income-maintenance programs, and community empowerment.

The General Examination for advancement to candidacy generally occurs at the end of the second year. After advancement to candidacy, students devote full time to completion of their dissertation research. The last step before award of the degree is the Final Examination, which consists mainly of the defense of the dissertation. Students are strongly encouraged to remain in residence at the University until the dissertation is accepted. The Ph.D. program is designed to take approximately three to four years, although academic excellence in learning and performance is always the first criterion for degree progress.

Admission

Admission is highly selective and students are admitted only for autumn quarter entry. Applicants should

have a master's degree in social work or comparable preparation in a closely related field.

The Council on Social Work Education requires that faculty who teach required practice courses in accredited programs must have two years of supervised post-MSW practice. Thus, obtaining the post-MSW experience is highly important for those who seek academic positions following graduation.

Applicants selected for admission are those whose scholastic achievements, previous experience, and aptitude for social welfare research, scholarship, and teaching indicate the greatest promise for achieving the objectives of the program. In addition, an effort is made to maintain a balanced student group reflecting the range of concerns in social work and social welfare as well as the diversity goals of the University. The deadline for receipt of admission material is January 16.

Financial Aid

A limited number of stipends, scholarships, teaching and research assistantships, and tuition waivers are available. While every effort is made to provide aid to each student who requires it, priority is given to first- and second-year Ph.D. students. However, it is unlikely that the financial assistance provided to any student would be adequate to cover all educational and living expenses. Financial aid forms required for financial assistance must be submitted by February 15 by completing the Free Application for Federal Student Aid (FAFSA).

Correspondence and Information

Graduate Program Coordinator
Ph.D. Program in Social Welfare, Box 354900
Seattle, WA 98105-6299

Center for Practice and Policy Research

In addition to its degree programs, the School maintains the Center for Practice and Policy Research, which is the focal point of the School's policy and research activities. The Center serves as a resource within the School of Social Work and the social welfare community, both regional and national, for the design, implementation, and evaluation of human services policies and practices. Areas of research include prevention, crime and delinquency, substance abuse, family violence, child welfare, AIDS, ethnic-minority issues, mental health, women's issues, and services to the elderly. The research projects operated within the Center reflect the increased recognition of the need for systematic research and evaluation to test the effectiveness of social service programs and policies.

Information about the Center can be obtained from the Center for Practice and Policy Research, School of Social Work, Box 354900, Seattle 98105-6299, telephone 685-1685.

Faculty

Professors

- Catalano, Richard F. * 1979; PhD, 1982, University of Washington; crime and drug abuse prevention and treatment, research methods and statistics.
- Conte, Jon * 1990; PhD, 1979, University of Washington; effects of sexual abuse on children and adult survivors, prevention of sexual abuse.
- Gilchrist, Lewayne D. * 1981; PhD, 1981, University of Washington; health promotion and disease prevention in community settings, women's health, research methods.
- Hawkins, John D. * 1976; PhD, 1975, Northwestern University; crime and delinquency, substance abuse, social development, research, prevention.

Hooyman, Nancy * 1979; PhD, 1974, University of Michigan; aging, caregivers of dependents, feminist practice, community organization development.

Jaffee, Ben-Joshua * 1967, (Emeritus); DSW, 1972, Columbia University; loss, grief, mourning and social work practice; ethnic minority perspectives on loss and grief.

Levy, Rona L. * 1975; PhD, 1974, University of Michigan; research methodology, single-case evaluation, health care, behavioral medicine, biofeedback.

Longres, John F. * 1993; PhD, 1970, University of Michigan; race and ethnicity; children, youth, and families.

Maier, Henry W. * 1959, (Emeritus); PhD, 1959, University of Minnesota; child development, group child care; direct practice with individuals, families, and groups.

Nurius, Paula S. * 1984; PhD, 1984, University of Michigan; social cognition, violence against women, research/computer supports for practice, critical thinking.

Parsons, Jack R. 1978, (Emeritus); MA, 1940, University of The Pacific; MS, 1943, Columbia University; PhD, 1958, University of Chicago; social work.

Plotnick, Robert D. * 1984; MA, 1973, PhD, 1976, University of California (Berkeley); economics of poverty, labor and social welfare policy.

Resnick, Herman * 1967; PhD, 1970, Bryn Mawr College; group process, organizational development, mediation, multimedia practice, international social work.

Richey, Cheryl A. * 1973; DSW, 1974, University of California (Berkeley); cultural and gender issues, intervention design and research.

Roffman, Roger Alan * 1972; DSW, 1983, University of California (Berkeley); alcoholism and drug abuse, AIDS prevention, domestic violence, research methodology.

Stier, Florence E. * 1964, (Emeritus); MS, 1941, University of Pittsburgh; social welfare planning and program development.

Takagi, Calvin Y. 1961, (Emeritus); MSW, 1952, PhD, 1958, University of Minnesota; mental health services, child development, services to minority populations.

Weatherley, Richard A. * 1975; PhD, 1975, Massachusetts Institute of Technology; social welfare policy and administration, poverty and inequality.

Whittaker, James * 1970; PhD, 1970, University of Minnesota; child welfare, in-home foster family care and residential services, social support networks.

Associate Professors

Anderson, James R. * 1968, (Emeritus); MA, 1954, Indiana University; social work and health care; growth and development, particularly Black Americans.

Balassone, Mary Lou * 1986; DSW, 1987, University of California (Berkeley); health care policy and delivery systems, maternal and child health.

Berleman, William C. * 1965, (Emeritus); MSW, 1960, University of Washington; undergraduate social welfare, social welfare policy.

Dear, Ronald Bruce * 1970; DSW, 1972, Columbia University; American social welfare policy and services, poverty and inequality, legislative advocacy.

Duplica, Moya M. * 1963; MSW, 1956, St Louis University; social welfare policy and history, women and social policy, values/ethics in social work practice.

Ellis, Jack A. N. * 1966, (Emeritus); MSW, 1955, University of British Columbia (Canada); social welfare administration and planning, social work and the social justice system.

Ezell, Robert M. * 1986; PhD, 1985, Florida State University; administration, fiscal management, juvenile justice policies and programs, grant writing.

Gillmore, Mary Louise 1977; MS, 1970, University of Michigan; MA, 1977, PhD, 1983, University of Washington; adolescent sexuality and substance abuse.

Hanneman, Carl F. 1967, (Emeritus); MA, 1951, Indiana University; aging, alcoholism, human services practice.

Herrick, James E. * 1966; DSW, 1966, University of Southern California; social policy, social work and the justice system, research methodology, social and cultural change.

Icard, Larry * 1993; DSW, 1992, Columbia University; AIDS prevention intervention design and research, administration, race/ethnic minority group issues.

Ishisaka, Anthony H. * 1971; DSW, 1978, University of California (Berkeley); social work practice, mental health services, services to minority communities, human development.

Kelley, Jerry Lee * 1961, (Emeritus); MA, 1949, University of Chicago; social workers in schools, interviewing and counseling in human services.

Kopp, Judy * 1983; PhD, 1982, Washington University; interviewing/counseling skills, clinical research, cross-cultural practice, Native Americans.

Kruzich, Jean * 1981; PhD, 1982, University of Washington; maternal depression and child abuse, organizational impacts on residents of long-term care agencies.

Leigh, James William * 1967, (Emeritus); MSW, 1954, Wayne State University; social work practice with families, multiethnic and multicultural concerns, family life education.

Miller, Sidney * 1962, (Emeritus); MS, 1953, Columbia University; children, adolescents, and their families; interviewing, crisis intervention, marital counseling.

Morrison, Diane M. * 1980, (Research); PhD, 1982, University of Washington; sexual decision-making, attitudes and behavior, teen pregnancy.

Mundi, Lenora B. 1985, (Emeritus); MSW, 1950, University of Washington; family treatment.

Pecora, Peter * 1990; PhD, 1982, University of Washington; child welfare practice, foster care, family preservation services, personnel management.

Teather, Edward Charles * 1966; MSW, 1962, University of British Columbia (Canada); family-centered practice, group work, program development.

Uehara, Edwina * 1990; PhD, 1987, University of Chicago; qualitative/quantitative research methods, cross-cultural mental health, human services organization.

Assistant Professors

Allen, Allethia Lee * 1966, (Emeritus); MSW, 1950, Boston University; PhD, 1986, Walden University; social welfare policy, multiculturalism, women's issues, social work practice.

Almgren, Gunnar R. 1986; MSW, 1979, Portland State University; PhD, 1990, University of Washington; health care policy and practice.

Arthur, Michael * 1991, (Research); MLA, 1987, University of Michigan; PhD, 1990, University of Virginia; Project Director—Community Youth Activity, Six State Prevention Needs and Assessment.

Bending, Raymond L. 1987; MSW, 1983, University of California (Berkeley); PhD, 1992, University of Washington; American Indian child welfare practice and policy, social work in American Indian communities.

Fredriksen, Karen Ilene * 1993; PhD, 1993, University of California (Berkeley); gerontology, work and family dependent care, non-traditional families, social policy.

Kemp, Susan 1994; MA, 1981, University of Auckland (New Zealand); PhD, 1994, Columbia University.

Seyfried, Sherri 1994; MSW, 1979, Norfolk State; PhD, 1994, University of Illinois.

Sohng, Sue * 1990; PhD, 1989, University of Pittsburgh; action research and chronic mental illness, cross-cultural social work practice.

Senior Lecturer

Amidei, Nancy 1992; MSW, 1968, University of Michigan; poverty, public policy, advocacy.

Lecturers

Brevik, Carlene E. 1994; MSW, 1970, University of Washington.

Cahn, Katharine C. 1985; MSW, 1989, University of Washington; Director—Northwest Resource Center for Children, Youth, and Families.

DeLong, James B. 1985; MSW, 1979, University of Washington; Extended Program Coordinator, Practicum Coordinator, aging, men's issues.

Haggerty, Kevin P. 1985; MSW, 1989, University of Washington; Project Director—Focus on Families, Raising Healthy Children.

Roberts, Elizabeth A. 1982; MSW, 1975, University of Washington; Practicum Coordinator.

Spearman, Margaret L. 1992; MSW, 1975, Washington University; multiculturalism, social welfare management.

Wrenn, Rachel 1990; MSW, 1981, San Diego State University; PhD, 1987, University of Washington; maternal and child health services and policy, trans-cultural social work practice, field education.

Course Descriptions

Courses for Undergraduates

See page 56 for explanation of course numbers, symbols, and abbreviations.

Social Welfare BASW

SOC WF 200 Introduction to Social Work Practice (5) I&S Introduction to the practice of social work including the theoretical concepts and institutional framework that guide practice and the conceptual organization of the discipline. Three weekly lectures and two hours per week in field observation sessions. Lectures supplemented by audiovisual aids and by special guest practitioners. Credit/no credit only. Offered: W.

SOC WF 300 Historical Approaches to Social Welfare (3) I&S *Duplica* Stresses the origins and development of social welfare policy and programs, starting with the Elizabethan Poor Law (1601) and ending with the Social Security Act of 1935. The issue of poverty and the development of publicly funded income maintenance programs are central concerns. Required of social welfare majors. Open to nonmajors. Offered: AW.

SOC WF 310, 311, 312 Social Welfare Practice (3, 3, 3) Allen, Balassone, Spearman, Whittaker Sequence provides a conceptual framework for generalist social work practice with individuals, families, small groups, communities, and organizations. Introduces the roles, tasks, and functions of the social welfare practitioner, and theories and methods of intervention. Develops skills in problem assessment, intervention, termination, and evaluation. Prerequisite: social welfare junior. Offered: A W Sp.

SOC WF 320 Contemporary Approaches to Social Welfare (3) I&S *Duplica* Policy and program developments in the social welfare field since 1935. Typical topics include current income maintenance proposals, the emergence of programs to treat specific social dysfunctioning (mental health services) and the growth of a service-oriented society. Required of social welfare majors. Open to nonmajors. Prerequisite: 300. Offered: WSp.

SOC WF 390 Introduction to Social Welfare Research (3) Introduction to the logic of the scientific method as applied to research in social work and social welfare, to the interrelated steps in the conduct of a research study, the development of skills in the critical consumption of social welfare research and the relationship of this research to social welfare practice. Required of social welfare majors. Open to nonmajors by permission of instructor. Offered: W.

SOC WF 404 Cultural Diversity and Justice (3) Bending, Duplica History and culture of disadvantaged and oppressed groups served by Social Welfare generalist practitioners. Offered: W.

SOC WF 405 Fieldwork Seminar (2/4, max. 6) Balassone Integrates social work practicum experiences with prior and concurrent course work in social sciences, social work, and research. Includes discussion of class presentations and simulations or practice situations that combine knowledge and skill utilization. Student logs provide a basis for individual goal identification and achievement. Required of social welfare seniors. To be taken concurrently with 415. Prerequisites: social welfare senior, 310 and 311. Offered: AWSp.

SOC WF 409 Readings in Social Welfare (1-5, max. 15) Prerequisite: permission of instructor.

SOC WF 415 Beginning Field Instruction (4-6, max. 12) Students are placed in selected social service agencies and accept beginning social service assignments under the supervision of competent agency personnel. Credit/no credit only. Prerequisites: social welfare major and 300, 310 and 311. Offered: AWSp.

SOC WF 419 Adult Development and Aging (3) I&S Introduces the field of adult development. Interdisciplinary perspective stressing the interaction of psychological, social, and physiological factors affecting the aging process. Goals are to help the student understand the processes and diversity in the aging process that can assist one's own aging and help the learner work with older adults. Offered: Sp.

SOC WF 421 Methods of Child Care and Treatment (3) Whittaker Focuses on an introduction to the continuum of child welfare services and presents practical approaches to working with children and adolescents in a wide variety of practice settings. Offered: alternate years; A.

SOC WF 430 Child Care Work Practice (3) Whittaker Specialized practice with emotionally disturbed and delinquent children in group-care settings with focus on providing child-care staff with specific tools for teaching alternative behavior. Major topics include: etiology and diagnosis, observing and recording children's behavior, special problems of group living, life-space interviewing, token economies, activity programming, group interventions, parental involvement, organizational requisites and community linkages. Prerequisite: 310 or permission of instructor. Offered: alternate years; A.

Courses for Graduates Only

Social Work

SOC W 501 Social Policy and Economic Security (3) Dear, Duplica, Herrick, Weatherley Study of United States welfare system with emphasis on income maintenance programs. Analytical and descriptive focus on major income maintenance and social insurance programs, their strengths and weaknesses, and their historical, philosophical, and cultural foundations. Examines poverty, inequality, unemployment, and homelessness in context of emergent welfare state and related policies. Offered: A.

SOC W 502, 503 Human Behavior and Social Environment I, II (3, 3) Longres Human functioning in a social context across the life span. Includes human biological, psychological, social, and cultural function-

ing across the range of social systems in which individuals live, i.e., cultures, institutions, communities, organizations, groups, and families. Credit/no credit only. Offered: A, W.

SOC W 504 Cultural Diversity and Social Justice (3) Bending, Sohng, Spearman History, culture, and status of disadvantaged and oppressed groups served in public sector social work practice. Credit/no credit only. Offered: AW.

SOC W 505 Foundations of Social Welfare Research (3) Balassone, Catalano, Roffman Overview of research process/methods in social work, with focus on consuming and performing practice-related research and evaluating one's own practice. Emphasis on critical understanding of empirical literature, development of useful and appropriate questions about social work practice, and strategies and techniques for doing research and applying findings to practice. Offered: Sp.

SOC W 506 Social Work: A Profession for Change (3) Introduction to the foundations, approaches, and skills necessary for social work practice with individuals and families, groups, organizations, and communities across the fields of social welfare. Credit/no credit only.

SOC W 510 Practice I: Introduction to Social Work Practice (3) Conte, DeLong, Kopp, Richey, Roffman, Teather Foundation knowledge and skills for direct practice with individuals, families, and groups. Assists students toward mastery of interviewing and relationship building skills, knowledge of cross-cultural communication and practice issues, and of social work values and ethics. Provides opportunity to develop beginning level skills in assessment. Offered: ASP.

SOC W 511 Practice II: Intermediate Direct Service Practice (3) Conte, DeLong, Kopp, Sohng, Wrenn Foundation knowledge and skills for direct practice with individuals, families, and groups. Course assists students toward mastery in assessment, development of treatment plans based on theory and assessment information, goalsetting skills, and selection of appropriate interventions. Offered: AW.

SOC W 512 Practice III: Managing Agencies for Service Effectiveness (3) Fredriksen, Icard, Kruzich, Uehara Focuses on ways in which management activities contribute to service effectiveness for clients and quality of conditions for staff. Various managerial roles, functions, and skills examined. Impact of agency structure, culture, and mission on staff, clients, and organizational outcomes discussed with emphasis on ways social work managers influence change. Offered: W.

SOC W 513 Practice IV: Community Change Practice (3) Herrick, Icard Provides frame of reference and skills for community-based social work practice. Theories of social change are examined with examples drawn from community organizing and policy advocacy. Offered: Sp.

SOC W 515 Foundation Practicum (1-8, max. 12) DeLong, Hanneman, Rivara, Roberts, Wrenn Agency-based practicum with emphasis on development of knowledge, perspectives, and skills needed for practice with individuals, families, groups, organizations, and communities. Credit/no credit only. Prerequisite: social work major. Offered: AWSpS.

SOC W 525 Advanced Practicum (2-10, max. 24) DeLong, Hanneman, Rivara, Roberts, Wrenn Agency-based advanced practicum. Prerequisite: 515 and foundation courses. Credit/no credit only. Prerequisite: social work major. Offered: AWSpS.

SOC W 531 Child and Family Policy and Services (3) Pecora, Whittaker Examines selected areas of child and family services policy in terms of historical antecedents, expressed values, practice implications, and potential for policy reform. Representative topical areas include: foster care; family preservation and

support; residential services; services to prevent and ameliorate child maltreatment. Offered: A.

SOC W 532 Children, Youth, and Family Practice I (3) *Kemp, Teather* Builds on foundation practice methods sequence to deepen individual, family, and community level assessment and intervention skills relevant for work with children, youth, and families. Offered: ASP.

SOC W 533 Children, Youth, and Family Practice II (3) *Kemp, Teather* Builds on 532 and focuses on the values, knowledge, and skills used in intensive case management and intensive family preservation services. Offered: A.

SOC W 535 Advanced Social Work Research: Children, Youth, and Families Practice (3) *Richey* Principles and procedures for evaluation of direct practice interventions, research methods involved in community-needs assessment, program evaluation, and management-information systems. For Children, Youth, and Families (CYF) concentration. Offered: W.

SOC W 536 Children, Youth, and Family Methods (3, max. 9) *Bending, Cook, Dear, Kemp, Kopp, Pecora, Roffman, Teather, Whittaker* Focuses on child welfare and family services intervention methods, including social work in schools, services for early intervention, prevention and family support, child and adolescent mental health services, work with families of developmentally disabled, permanency planning, group work, family violence and child maltreatment, and intensive family preservation services. Offered: AWSp.

SOC W 541 Policy Perspectives on Multi-Ethnic Practice (3) *Bending* Presentation of social welfare policies and services that meet societal problems, needs of specific client groups, and tools for evaluating various policies in the multi-ethnic area. Facilitates understanding of network of institutions that employ social workers. Offered: A.

SOC W 542 Introduction to Multi-Ethnic Practice (3) *Bending, Longres* Examination of selected social welfare problems as related to specific racial-ethnic minority groups. Attention is given to understanding of minority populations and the effective delivery of social work and social welfare services in minority communities. Offered: Sp.

SOC W 545 Advanced Social Work Research: Participatory Action Research for Multi-Ethnic Practice (3) *Sohng* Principles and procedures for the evaluation of direct practice interventions, research methods involved in community-needs assessment, program evaluation, and management-information systems. For Multi-Ethnic Practice (MEP) concentration. Offered: W.

SOC W 546 Multi-Ethnic Practice Methods (3, max. 9) *Herrick, Leigh* Focus on specialized knowledge and skills necessary for effective social work with American Indian, African American, Asian American, and Latino or Hispanic individuals, groups, and communities and for work in a variety of settings and fields of practice. Offered: AWSp.

SOC W 552 Leadership in Program Development (3) *Fredriksen, Kruzich* Introduces the practice skills and knowledge required for specialized practice in agency management. Offered: Sp.

SOC W 553 Social Work Supervision (3) *Kruzich, Pecora* Presents critical skills for major phases of the personnel process including recruiting, supervising, and supporting employees. Offered: A.

SOC W 554 Financial Management in Human Services (3) *Ezell* Focus on key budgeting concepts and techniques common to human service agencies including budget development, resource allocation, problems of fiscal control, fiscal record keeping, and cost analysis. Offered: W.

SOC W 555 Advanced Social Work Research: Using Information to Improve Agency Performance for Administration (3) *Ezell, Uehara* Principles and procedures for the evaluation of direct practice interventions, research methods involved in community-needs assessment, program evaluation, and management-information systems. For Administration (ADM) concentration. Offered: W.

SOC W 556 Social Work Administration Methods (3, max. 9) *Ezell, Fredriksen, Icard, Kruzich, Pecora, Uehara* Focus on relevant skills for social work administrators, including such topics as fundraising, grantwriting, and advocacy. Offered: WSp.

SOC W 557 Advanced Social Welfare Administration (3) Concepts and practice skills for the management of social welfare organizations with emphasis on management practice in settings offering clinical social services. Includes analysis of treatment settings and auspices, management of interdisciplinary professional teams, overview of clinical practice technology, and planning, implementing, controlling, and budgeting in a human-services agency context.

SOC W 558 Organizational Analysis (3) *Kruzich, Weatherley* Conceptual base for analysis and action in human-service organizations with emphasis on utilization of conceptual tools of organization theory for problem solving in social welfare organizations. Techniques to describe and analyze selected organizational problems and contribute to their solutions. Prerequisite: permission of instructor.

SOC W 559 Group Process (3) *Resnick* Provides tools for students to understand dynamics and development of the group process, to increase awareness of participant and leader behavior, and to improve effectiveness as participants and as leaders. Prerequisite: permission of instructor.

SOC W 561 Health and Mental Health Policy (3) Review of trends in the development of health and mental health policies and services in the United States, the linkage between key policies and care, initiatives for reform in policy and health/mental health care models, and social work roles. Offered: A.

SOC W 562 Adult Psychopathology and Chemical Dependency (3) *Roffman* Two components—mental disorders and addictions—focus on advanced assessment skills, the strengths and weaknesses associated with alternative diagnostic schemes, physiological factors, and theoretical underpinnings of alternative treatment models. Offered: Sp.

SOC W 563-564 Advanced Health and Mental Health Practice I-II (3-3) *Almgren, Conte, Levy* Emphasizes advanced social work practice skills in health and/or mental health settings. Attention is given to key theoretical bases for assessment and intervention with clients and client systems. Offered: A.

SOC W 565 Advanced Social Work Research: Health and Mental Health (3) *Levy* Covers methods of measurement, direct practice evaluation, ethical issues, and research methodology of special interest in health and mental health settings. Additional topics may include grant writing, community needs assessment, and management information systems. Offered: W.

SOC W 566 Health and Mental Health Methods (3, max. 9) *Jaffee, Roffman* Focus on a variety of specialized social work practice roles in such health and mental health fields as addiction and grief and loss. Emphasis is given to advanced skills and knowledge for specialized expertise. Offered: WSp.

SOC W 592 Social Problems and Social Welfare (3, max. 9) *Balassone, Duplica, Roberts, Roffman* Analysis of major social problems and social welfare service systems providing a systematic approach to assessing the scope, causes, social cost, and public policy alternatives in the provision of ser-

vices related to such problems. Selected social problems are studied and related to the student's field.

SOC W 594 Advanced Human Services Practice (3, max. 9) *Kopp, Levy, Sohng* Integration of practice and research with an understanding of and an ability to perform practice skills such as specification of problems and goals, intervention planning, evaluation. Scientific reasoning applied to practice tasks with problems including value conflicts and ethical dilemmas.

SOC W 595 Problem-Focused Human Development (3, max. 9) *Hanneman, Roffman* Focus on the social and developmental determinants of specific human problems and their impact on individual development, families, and social institutions. Some time given to examining the nature of organized social responses that are designed to deal with the specified human problem.

SOC W 597 Seminar (3, max. 6) Seminar for special topics in social work.

SOC W 598 Integrative Seminar (1-3, max. 12) Integrates specialized knowledge in social work settings. Credit/no credit only. Offered: AWSp.

SOC W 599 Readings in Social Work (*) Independent Studies. Credit/no credit only. Prerequisite: permission of instructor. Offered: AWSp.

SOC W 600 Independent Study or Research (*)

SOC W 700 Master's Thesis (*)

Social Welfare

SOC WL 552 Analytical Perspectives on Social Welfare Policy (3) *Plotnick, Weatherley* Broad overview of the social welfare policy process, including content on social problem construction and definition, policy agendas and case study methodology. Introduction to analytical tools and concepts needed to take a proactive role in policy development, advocacy, implementation, and policy research. Offered: Sp.

SOC WL 553 Seminar in Contemporary Social Welfare Policy (3) *Plotnick, Weatherley* Major American social welfare policies and economic, political, and social factors that guide their development, implementation, and effectiveness. Critical review of contemporary income maintenance and related policies, and evaluation of their effectiveness in reducing poverty and income inequality, and assessment of proposals for reform. Closely linked to 552. Offered: Sp.

SOC WL 558 Integrative Seminar (1-2) *Nurius* Topic-driven seminar that targets professional development of the first and second years (scholarship, research, teaching). Active participation expected in discussions and reflective papers. May require preparation for presentation or demonstration. Offered: WSp.

SOC WL 580, 581 Introduction to Advanced Research Method and Design (3, 3) *Gilchrist, Uehara* Introduction to the broad scientific issues and the specific methodological strategies used in formulating and answering research questions within the field of social welfare. Offered: A, W.

SOC WL 582-583 Research Practicum (3-3) Development of specific methodological skills in social welfare research through participation in an ongoing research project. Credit/no credit only. Offered: ASPs.

SOC WL 584 Teaching Practicum (3) Supervised teaching of a required course or teaching as a co-instructor or teaching assistant with a faculty member. Learning contract used to target specific teaching competencies, e.g., assessing and evaluating student outcomes, identifying class session goals and objectives, tailoring instruction methods to diverse learning styles. Offered: AWSpS.

SOC WL 587 Fundamentals of Social Work Statistics I (4) *Gillmore* Descriptive and inferential statistics. Underlying logic of statistical inference. Statistical

issues of special relevance in social work, including measurement, research design, and ethics in research. Prerequisite: concurrent registration in 580. Offered: A.

SOC WL 588 Fundamentals of Social Work Statistics II (4) *Gillmore* Issues in the use of descriptive and inferential statistics, especially the statistical control of extraneous variables. Applications of statistical inference in factorial design, and correlation and regression. Statistical issues of special relevance in so-

cial work. Ethics in the use of statistics. Prerequisite: concurrent registration in 581. Offered: W.

SOC WL 598-599 Research Problems and Priorities in Social Work and Social Welfare (3-3) Enables students to assess the state of social work and social welfare knowledge in a social problem/issue; examines conceptual and methodological concerns for identifying research priorities and implications for evaluating policy, programs, and practice. Emphasizes peer interchange and developing conceptual

and analytical skills. Prerequisite: admission to social welfare Ph.D. program or permission of instructor. Offered: A.W.

SOC WL 600 Independent Study or Research (*) Prerequisite: approval of a well-specified plan by the instructor and program director. Includes a written product. Offered: AWSpS.

SOC WL 800 Doctoral Dissertation (*) Offered: AWSpS.



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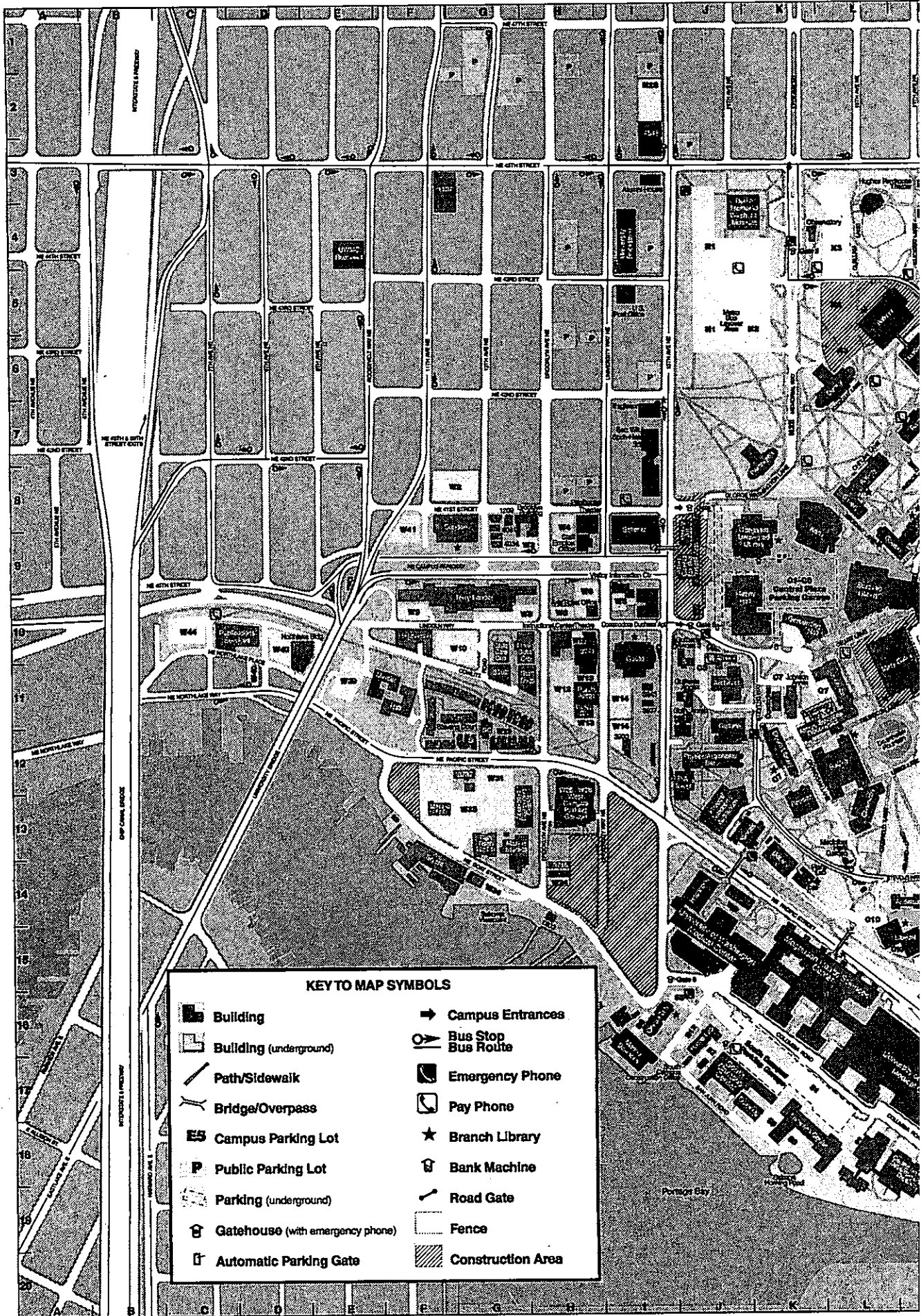
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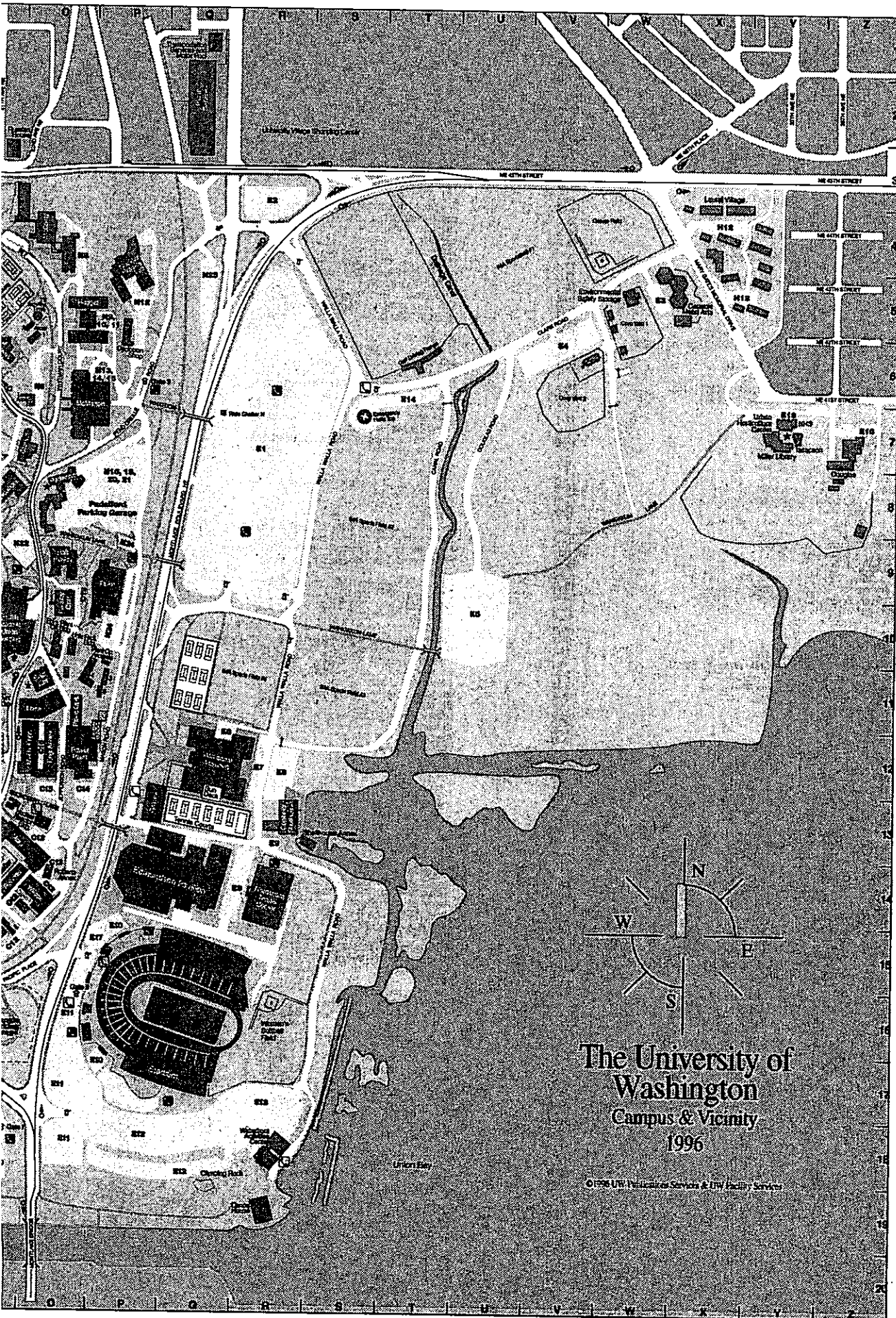
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KEY TO MAP SYMBOLS

- | | |
|----------------------------------|-------------------|
| Building | Campus Entrances |
| Building (underground) | Bus Stop |
| Path/Sidewalk | Bus Route |
| Bridge/Overpass | Emergency Phone |
| Campus Parking Lot | Pay Phone |
| Public Parking Lot | Branch Library |
| Parking (underground) | Bank Machine |
| Gatehouse (with emergency phone) | Road Gate |
| Automatic Parking Gate | Fence |
| | Construction Area |



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Academic and Professional Programs, 5001 - 25th Ave. N.E.	off map	Drama Scene Shop, 3941 University Way N.E. (DSC)	10-H
Academic Computer Center, 3737 Brooklyn Ave. N.E. (ACC)	13-G	Drug Plant Garden and Laboratory	14-L
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Alumni House, 1415 N.E. 45th St.	3-I	Education Assessment Center, Schmitz Hall	9-I
Anderson Hall (AND)	14-M	Educational Television KCTS-TV, Seattle Center	off map
Anthropology, Denny Hall	6-L	Electrical Engineering, Electrical Engineering Building (EEB)	13-N
Applied Mathematics Department, Guggenheim Hall	11-N	Emergency Telephones 14-J, 3-J, 4-N, 9-R, 18-Q and at all Gate Houses	11-O
Applied Physics Laboratory, Henderson Hall	10-F	Engineering, Loew Hall	12-O
Arboretum, over Montlake Bridge to Washington Park		Engineering Annex, (EGA)	11-O
Architecture, Gould Hall	11-I	Engineering Library, Engineering Library Building	12-O
Architecture and Urban Planning Library, Gould Hall	11-I	English, Padelford Hall	9-O
Architecture Hall (ARC)	11-J	Environmental Health and Safety, Hall Health Center	9-O
Art, Art Building (ART)	8-M	Environmental Safety Storage Building	5-W
Art Library, Art Building	8-M	Ethnic Cultural Center, 3931 Brooklyn Ave. N.E. (ECC)	10-H
Arts and Sciences, Padelford Hall	8-O		
Asian Languages and Literature, Gowen Hall	9-M	Faculty Center	10-O
Associated Students (ASUW), Student Union Building (HUB)	10-N	Fisheries, Fisheries Center (FIS)	18-K
Astronomy, Physics Hall	11-L	Fisheries-Oceanography Library,	
Astronomy-Physics Library, Physics Hall	11-L	Oceanography Teaching Building	18-I
Atmospheric Sciences,		Fisheries Research Institute, Fisheries Center	18-K
Atmospheric Sciences-Geophysics Building (ATG)	12-K	Fisheries Teaching and Research Center	14-O
Attorney General's Division, Gerberding Hall	10-K	Flag Pole	8-X
		Fiske Hall, Washington Technology Center	9-P
Bagley Hall (BAG)	12-L	Food Services Facilities:	
Balmer Hall (BLM)	5-M	By George, Odegaard Undergraduate Library	9-K
Bank Cash Machine (HUB)	11-O	E-Court Cafe	18-L
Bank Machines		Haggett Hall	5-P
Odegaard Undergraduate Library	9-K	Hospital Cafeteria	18-M
South Campus Center	17-J	Husky Den, Student Union Building	10-N
University of Washington Medical Center	18-N	Mac City Square	7-O
Benefits Office, Staff Services Building	11-G	South Campus Center	17-J
Benson Hall (BNS)	13-K	Terry Cafe	10-O
Bioengineering, Aerospace and Engineering		Forest Resources, Institute of, Anderson Hall	14-M
Research Building & Harris Lab	12-N, 19-I	Forest Resources, Anderson Hall	14-M
Biology Program, Hitchcock Hall	14-J	Forest Resources Library, Bloedel Hall	15-M
Blakely Village (BLV)	off map	Friday Harbor Laboratories, Kincaid Hall	13-J
Bloedel Hall (BDL)	15-M		
Book Store, 4328 University Way N.E.	4-I	Genetics, Magnuson Health Sciences Center	15-K
Branch, Student Union Building (HUB)	10-N	Geography, Smith Hall	9-M
Branch, South Campus Center	17-J	Geography Library, Smith Hall	9-M
Botany, Hitchcock Hall	14-J	Geological Sciences, Johnson Hall	11-L
Botany Greenhouse (BGH)	14-K	Geophysics, Atmospheric Sciences-Geophysics Building	12-K
Brooklyn Building (BRK)	8-H	Gerberding Hall (GRB) formerly Administration Building	10-K
Bryant Building, 1101 N.E. 80th St. (BRY)	14-F	Germanics, Denny Hall	8-L
Building Construction, Gould Hall	11-I	Golf Driving Range (GDR)	6-T
Burke Memorial Washington State Museum (BMM)	4-J	Gould Hall (GLD), 3949 - 15th Ave. N.E.	11-I
Business Administration, Mackenzie Hall	8-M	Gowen Hall (GWN)	9-M
Business Administration Library, Balmer Hall	5-M	Graduate School, Gerberding Hall	10-K
Business and Finance, Gerberding Hall	10-K	Graves Annex (GBA)	14-O
		Graves Building (TGB)	13-O
Campanile	8-K	Graves Field	4-W
Canoehouse (CNH)	18-R	Guggenheim Hall (GUG)	11-N
Capital Projects Office, University Facilities Building	10-O	Guthrie Annexes 1, 2, 3, and 4	
Cashier's Office, Schmitz Hall	9-I	(GA1, GA2, GA3, and GA4)	12-J, 11-J, 11-J, 11-J
Center for Quantitative Sciences in Forestry, Fisheries		Guthrie Hall (GTH)	12-J
and Wildlife, 3737 - 15th Ave. N.E.	15-I		
Center for Studies in Demography and Ecology, Savery Hall	8-L	Haggett Hall (HGT)	5-P
Center for Human Development & Disability	19-M	Hall Health Center (HLL)	9-O
Central Plaza Garage, Central Plaza (CPG)	9-K	Hansen Hall (HNS)	3-M
Central Stores, Plant Services Building	2-Q	Harris Hydraulics Laboratory (HHL)	17-J
Ceramic and Metal Arts Facility (CMA)	5-X	Health Sciences Annex 4	15-K
Ceramic Engineering, Roberts Hall	14-O	Health Sciences Center	
Chemical Engineering, Benson Hall	13-K	(Magnuson Health Sciences Center)	15-K
Chemistry, Bagley Hall	12-L	Health Sciences Library,	
Chemistry Building	13-L	Magnuson Health Sciences Center	15-K
Chemistry Library, Chemistry Library Building	12-K	Henderson Hall, (HND) 1013 N.E. 40th St.	10-F
Civil Engineering, More Hall	14-O	Henry Art Gallery (HAG)	9-J
Clark Hall (CLK)	7-O	History, Smith Hall	9-M
Classics, Denny Hall	9-L	Hitchcock Hall (HCK)	14-L
Climbing Rock	19-O	Hospital, University of Washington Medical Center (UWMC)	17-M
Columns and Sylvan Theater	13-N	HUB (Student Union Building)	10-N
Commodore-Duchess Apartments, (CDA) 4009 - 15th Ave. N.E.	10-I	Hughes Penthouse Theater (HPT)	4-L
Communications, Communications Building (CMU)	9-N	Hutchinson Hall (HUT)	5-M
Comparative Literature, Padelford Hall	8-O		
Comptroller, Gerberding Hall	10-K	Infirmery, Hall Health Center	9-O
Computer Science, Sieg Hall	11-M	Institute for Marine Studies, Marine Studies	14-G
Condon Hall (CDH), 1100 Campus Parkway N.E.	8-F	Institute for Public Policy and Management,	
Conference and Management, 5001 - 25th Ave. N.E.	off map	324 Parrington Hall	9-X
Comber Shellhouse (CSH)	13-R	Instructional Center/Theater, (ICT)	
Continuing Education, (See University Extension)	off map	1307 N.E. 40th St.	10-H
Copy Centers:		Instructional Media Services, Kane Hall	9-L
838 Gerberding Hall	10-K	Intercollegiate Athletics, Graves Building	13-O
115 Balmer Hall	9-M	International Pacific Halibut Commission,	
Child Development and Mental Retardation Center, CD184	19-M	Oceanography Teaching Building	18-I
Child Development and Mental Retardation Center, CD184	9-N	International Services Office, Schmitz Hall	9-L
8042 Communications Building	8-G	International Studies, Thomson Hall	9-N
235 Condon Hall	11-O	Intramural Activities Building (IMA)	12-O
202 Engineering Library	15-K	Isaacs Hall (ISA)	7-Y
A206 and E220 Health Sciences	9-K		
127 Odegaard Library	10-L	Johnson Annex A (JHA)	11-K
560 Suzzallo Library	17-L	Johnson Hall (JHN)	11-L
BB381 University Hospital	17-M		
EE104 University Hospital	9-I	Kano Hall (KNE)	9-L
Counseling Center, Schmitz Hall	11-K	Keep Washington Green Association, Anderson Hall	14-M
Cunningham Hall, Cunningham Gallery (ICH)	5-P	Kincaid Hall (KIN)	13-J
Cyclotron, Nuclear Physics Laboratory	5-P	Kirsten Aeronautical Laboratory (KIR)	11-N
Cyclotron Shop, Nuclear Physics Laboratory	5-P	KUOW Radio, Communications Building	9-N
Denny Hall (DEN)	8-L	Lander Hall, 1201 N.E. Campus Parkway	10-G
Dentistry, Magnuson Health Sciences Center	15-K	Landscape Architecture, Gould Hall	11-I
Douglas Research & Conservatory, Urban Horticulture Center	7-Z	Language Learning Center, Denny Hall	9-L
Drama, Hutchinson Hall	5-M		
Drama Library, Hutchinson Hall	5-M		

Laurel Village (LAV)	4-X	Radio Broadcast Services and KUOW, Communications Building	8-N
Law, Condon Hall	8-F	Rainier Vista	15-N
Law Library, Condon Hall	8-F	Rail Hall (RAI)	7-M
Lewis Hall (LEW)	8-N	Real Estate Office, 1326 - 5th Ave.	off map
Lewis Annexes 1, 2 and 3	6-O, 5-O, 7-O	Regents, Board of, Gerberding Hall	10-K
Library and Information Science, Suzzallo Library	10-L	Registrar, Schmitz Hall	9-J
Linguistics, Padelford Hall	8-O	Roberts Annex	14-O
Lowell Hall (LOW)	11-O	Roberts Hall (ROB)	14-O
Mackenzie Hall (MKZ)	9-M	Romance Languages and Literature, Padelford Hall	8-O
Magnuson Health Sciences Center	15-K	ROTC, Aerospace Studies, Clark Hall	7-O
Magnuson Health Sciences Center Annex 4	15-K	ROTC, Military Science, Clark Hall	7-O
Mailing Services, Publications Services Building	10-C	ROTC, Naval Sciences, Clark Hall	7-O
Marina Apartments 1104 N.E. Boat St.	13-F	Russian House, 2104 N.E. 45th St.	3-N
Marine Resources, 3716 Brooklyn Ave. N.E.	14-H	Sakuma Viewpoint	14-G
Marine Sciences Building (MSB)	17-I	Selman Homing Pond	19-K
Marine Studies Building (MAR), 3707 Brooklyn Ave. N.E.	14-G	Savery Hall (SAV)	8-I
Mary Gates Hall (MGH) formerly Physics Hall	11-L	Scandinavian Languages and Literature, (Raitt Hall)	7-M
Mathematics, Padelford Hall	8-O	Schmitz Hall, (SMZ), 1410 N.E. Campus Parkway	8-I
Mathematics Research Library, Padelford Hall	8-O	Shellhouse Annex	13-S
McCarthy Hall (MCC)	4-O	Sig Hall (SIG)	11-M
McMahon Hall (MCM)	7-O	Slavic Languages and Literature, Smith Hall	8-M
Meany Hall (MNY)	10-J	Smith Hall (SMI)	8-M
Mechanical Engineering, Mechanical Engineering Building (MEB)	12-O	Social Work, Social Work/Speech and Hearing Sciences Building (SWS)	7-I
Medicine, Magnuson Health Sciences Center	15-K	Social Work Library, Social Work/Speech and Hearing Sciences Building	7-I
Memorial Way	3-K	Sociology, Savery Hall	9-I
Mercer Hall (MRC)	11-F	South Campus Center	17-J
Merrill Hall (MER)	7-Y	South Campus Parking Garage	17-K
Message Center (Tetox), 8042 Communications Building	8-N	Speech Communication, Raitt Hall	7-M
Military Science, Clark Hall	7-O	Speech and Hearing Clinic, Social Work/Speech and Hearing Sciences Building	7-I
Miller Hall (MLR)	8-N	Stadium, 3800 Montlake Blvd. N.E.	19-O
Miller Library, Merrill Hall	7-Y	Staff Employment Office, 1320 N.E. Campus Parkway	9-H
Mining, Metallurgical and Ceramic Engineering, Roberts Hall	14-O	Staff Services Building, 3903 Brooklyn Ave. N.E.	11-G
Minority Affairs, Schmitz Hall	9-I	Statistics Department, Padelford	8-O
Mueller Hall (MUE)	14-N	Stevens Court (STC)	11-G
More Hall (MOR)	14-O	Student Affairs, Schmitz Hall	9-I
Music, Music Building (MUS)	7-N	Student Employment, Schmitz Hall	9-I
Music Library, Music Building	7-N	Student Financial Aid, Schmitz Hall	9-I
Naval Sciences, Clark Hall	7-O	Student Health Center, Hall Health Center	9-O
Near Eastern Languages and Literature, Denny Hall	8-L	Student Housing, Schmitz Hall	9-I
Nordstrom Tennis Center (NTC)	15-R	Student Union Building (HUB)	10-M
Northlake Building, 814 N.E. Northlake Place (NLB)	10-D	Summer Quarter Office, (See University Extension)	off map
Northwest Center for Research on Women (NCROW) Cunningham Hall	11-X	Suzzallo Library (SUZ)	10-L
Northwest Horticultural Society Hall (NHS)	7-Y	Swimming Pools:	
Nuclear Engineering, Benson Hall	13-X	Edmundson Pavilion	14-G
Nuclear Physics Laboratory (NPL)	4-P	Hutchinson Hall	5-M
Nuclear Reactor Building (NRB)	13-O	Intramural Activities Building	12-Q
Nursing, Magnuson Health Sciences Center	15-K	Telephones	10-C, 11-J, 17-J, 4-K, 5-K, 11-L, 5-M, 7-N, 4-O, 13-O, 17-O, 16-P, 19-R, 8-S
Observatory (OBS)	4-X	Telephone Emergency	14-J, 3-J, 4-N, 8-R, 18-Q and at all Gate Houses
Oceanography, Oceanography Teaching Building (OTB)	18-I	Television Satellite Earth Terminal	5-O
Oceanography Building (OCB)	18-K	Tennis Courts	5-N, 11-O, 13-O, 15-R
Oceanography-Fisheries Library, Oceanography Teaching Building	18-I	Terry Hall, 1101 N.E. Campus Parkway	10-G
Oceanography Research Building (ORB)	18-I	Thomson Hall (THO)	9-B
Odgaard Undergraduate Library (OUG)	9-K	Transportation Services (TSB)	1-O
Office Machine Maintenance Shop, 3733 Pacific Lane	13-O	Triangle Parking Garage (TPG)	17-N
Ombudsman, Student Union Building	10-N	University Extension and Summer Quarter, 5001 - 25th St.	off map
Pacific Apartments, 3748-60 University Way N.E.	13-I	University Facilities Building (UFB)	10-O
Padelford Hall (PDL)	8-O	University of Washington Medical Center (UWMC)	17-M
Padelford Parking Garage	8-P	University Police, Bryant Building	14-F
Parking:		University Press, 1326 - 5th Ave.	off map
C-Areas	central campus	University Records Center	11-O
E-Areas	east campus	University Relations and Development, Gerberding Hall	10-K
N-Areas	north campus	Urban Horticulture Center	7-Y
S-Areas	south campus	Urban Planning, Gould Hall	11-I
W-Areas	west campus	Veterans Affairs and Special Services, Schmitz Hall	9-I
Parking Division, 3901 University Way N.E.	11-H	Views Through a Circle Earthwork	15-S
Parrington Hall (PAR)	8-K	Visitor Entrance	8-J
Pavilion Annex 2	14-R	Visitors Information Center, 4014 University Way N.E.	10-I
Performing Arts Ticket Office, 4001 University Way N.E.	10-H	Washington Monument (Statue)	9-J
Pharmacy, Magnuson Health Sciences Center H-Wing	15-K	Washington Sea Grant Program, 3716 Brooklyn Ave. N.E.	14-H
Philosophy, Savery Hall	8-L	Washington Technology Center, Fluke Hall	9-P
Philosophy Library, Savery Hall	8-L	Waterfront Activities Center (WAC)	18-R
Physical Plant Office Building	10-O	Wilcox Hall (WIL)	14-O
Physics, Physics/Astronomy Bldg.	11-L	Wilson Annex	15-N
Physics/Astronomy Building	13-J	Wilson Ceramic Laboratory (WCL)	15-O
Physics/Astronomy Library, Physics Hall	13-J	Winklerwerder Forest Sciences Laboratory (WFS)	15-M
Placement Center, Lowell Hall	11-O	Women's Information Center, Cunningham Hall	11-K
Plant Laboratory (PLT)	14-K	Zoology, Kincaid Hall	13-J
Plant Operations Building	11-O		
Plant Services Building, 4515 - 25th Ave. N.E.	2-Q		
Playhouse Theater (PHT), 4045 University Way N.E.	8-H		
Political Science, Gowen Hall	9-M		
Political Science Library, Smith Hall	9-M		
Post Office, U.S., 4244 University Way N.E.	5-I		
Postal Center, Self-Service, Student Union Building (HUB)	10-N		
Power Plant	12-O		
Practice Field	14-R, 11-R		
President's Office, Gerberding Hall	10-K		
Printing, Publications Services Building	10-C		
Psychology, Guthrie Hall	12-J		
Public Affairs, Parrington Hall	8-K		
Public Health and Community Medicine, Magnuson Health Sciences Center	15-K		
Publications, Publications Services Building, 3900 7th Ave. N.E.	10-C		
Purchasing and Accounting Building, 3917 University Way N.E.	11-H		
Quadrangle	8-M		
Quaternary Research Center, Atmospheric Sciences-Geophysics Building	11-K		
Radiation Ecology Laboratory, UWMC	18-M		

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(ACC) indicates building abbreviation used on official programs.